REPORT RESUMES

ED 003 227 56

CHANGES IN ATTITUDES DURING LEARNING. THE RELATIONSHIP OF NEW EDUCATIONAL MEDIA TO NONINTELLECTIVE FACTORS IN LEARNING, PHASE 2.

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REPORT NUMBER NDEA-VIIA-C-1139 PUB DATE 15 DEC 64
CONTRACT OEC-4-20-001
EDRS PRICE MF-$0.27 HC-$6.88 172P.

DESCRIPTORS- *MEDIA RESEARCH, ATTITUDES, EDUCATIONAL TELEVISION, *LEARNING PROCESSES, *CHANGING ATTITUDES, SECONDARY SCHOOLS, *STUDENT ATTITUDES, PROGRAM INSTRUCTION, *TEAM TEACHING, *AUDIOLINGUAL METHODS, FORT COLLINS, COLORADO

PROCEDURES WERE DEVELOPED TO MEASURE LONGITUDINAL CHANGES IN ATTITUDES TOWARD FORMAL LEARNING EXPERIENCES INVOLVING VARIOUS INSTRUCTIONAL MEDIA. THE ATTITUDES INVESTIGATED WERE--(1) ATTITUDE TOWARD METHODS OF INSTRUCTION EMPLOYED IN THE LEARNING SITUATION, (2) ATTITUDE TOWARD EXPECTATION FULFILLMENT, (3) ATTITUDE TOWARD SUBJECT MATTER CONTENT STUDIED, AND (4) OVERALL ATTITUDE AS REPRESENTED BY A COMPOSITE OF THE FOREGOING. FIVE PARALLEL FORMS OF A 26-ITEM SCALE MEASURING ATTITUDES TOWARD METHOD, EXPECTATION, AND CONTENT WERE DEVELOPED FOR ADMINISTRATION IN A VARIETY OF MEDIA SITUATIONS. THE SCORES AND SUBSCORES FOR 3,049 LEARNERS IN 72 SITUATIONS WERE CLASSIFIED INTO 11 MEDIA GROUPS. IT WAS CONCLUDED THAT IT IS POSSIBLE TO IDENTIFY MEASURABLE TRENDS IN LEARNER ATTITUDES TOWARD THE LEARNING SITUATION THROUGHOUT A VARIETY OF SITUATIONS INVOLVING DIFFERENT INSTRUCTIONAL MEDIA. (HB)

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CHANGES IN ATTITUDES DURING LEARNING

The Relationship of New Educational Media to Non-Intellective Factors in Learning - Phase II

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Charles O. Neidt
COLORADO STATE UNIVERSITY

Final Report
Title VII Project Number C-1139
National Defense Act of 1958
Contract Number 4-20-001

The research reported herein was supported by a grant from the U.S. Department of Health, Education, and Welfare Office of Education

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ACKNOWLEDGEMENTS

This study was made possible through the cooperation of many people. Although it is not possible to acknowledge all of them formally, the following deserve special recognition: Drs. Joseph L. French, Barton Griffith, Fred McKinney, and Steven Whitted, University of Missouri; Drs. Robert DeKeeffer, John Greenway, and John Kelso, University of Colorado; Drs. C. Dean Miller, L. Stanley Ratliff, Ernest E. Ellert, Robert A. Kainer, W. Claud Henry, and Miss Martha S. Trimble, Colorado State University; Captain Steven Church, Lowry Air Force Base; Drs. Edward Brainard and Paul McRill, Jefferson County Schools; Mr. William Lopez, Fort Collins Schools; Graduate Assistants, Nicholas F. Rayder, Dalva E. Hedlund, David I. Sheppard, Donald L. Thomas, Floyd E. Peterson, Terry F. Meredith, and Gilbert M. Russell, Jr., all of Colorado State University; and Secretary, Mrs. Jean C. Purslow.

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ABSTRACT

Neidt, Charles O.

Changes in Attitudes During Learning: The Relationship of New Educational Media to Non-Intellective Factors in Learning - Phase II. Fort Collins, Colorado, Colorado State University; December 15, 1965. 149 p. (USOE Title VII Project No. C-1139)

The central purpose of this research project was that of measuring longitudinal changes in attitudes toward formal learning experiences involving various instructional media. Attitudes investigated included: attitude toward methods of instruction employed in the learning situation, attitude toward expectation fulfillment, attitude toward subject matter content studied, and overall attitude as represented by a composite of the foregoing. Subordinate to the general purpose were the following specific purposes:

1. To determine the relationship of the number of administrations of attitude scales during a learning experience to changes in attitude and to final attitude scale scores obtained by learners.

2. To determine the relation of attitude change during learning to selected personal characteristics of the learners and to certain environmental factors in the learning situation.

3. To measure attitude change when programed instruction is interpolated between conventional learning experiences.

4. To estimate parameters of curves describing attitudinal changes by fitting linear and quadratic equations to longitudinal measurements of attitude obtained in situations involving different instructional media.

Five parallel forms of a 26-item scale measuring attitudes toward method, expectation, and content were developed for administration in a variety of media situations. Another somewhat similar scale was designed specifically for administration in audio lingual language laboratory situations. The scales were analyzed with respect to reliability and homogeneity in several situations. The median coefficient for twenty-eight estimates of total scores reliability involving all five forms of the generalized scale was .87, and the media reliability for two estimates for the language scale was .90. Evidence was found to support the concept of obtaining separate subscores within each scale.

The general design employed for most of the situations studied involved administering the five forms of the scale in counterbalanced order to learners at five equally-spaced intervals throughout each learning experience, the first administration occuring at the end of

the first one-fifth of the experience. Thus, for a one semester course, administrations were made at the end of the third, sixth, ninth, twelfth, and fifteenth weeks. More than six thousand subjects in over one hundred learning situations participated in one or more aspects of the study, although the final regression analyses were based upon approximately three thousand subjects in seventy-two situations classified into eleven media groups.

To determine the relationship between the number of scales administered in the learning situations and attitude change, varying patterns of from one to five scales were administered to students in educational television, audio lingual, and team teaching situations. It was found that, although attitude scale scores tended to decrease during the learning experiences, this decrease was not associated with the number of scales administered.

To determine the extent to which the attitudes measured in this study were related to some of the personal characteristics of the learners as well as to selected invironmental factors (other than instructional media), five college level situations involving four media were selected for investigation. In the first situation (large lecture class in English composition), both personal and environmental factors were investigated. In the second and third situations (anthropology and general psychology taught by educational television), only environmental factors were explored. In the fourth situation (combination lecture and programed instruction), the relationship between change in attitude and change in performance was investigated. In the fifth situation (large and small classes in educational psychology), class size was studied. From the five situations studied in this phase of the investigation, extensive evidence was found to indicate that attitudes toward method, expectation, and content are related to the personal characteristics of the learners. Conversely, no evidence was found to indicate a relationship of consequence between environmental factors in the learning situation and attitude change. These findings strongly indicated the necessity of accounting for individual differences among curves of attitude change within media situations.

Although most of the hypotheses tested in this research project involved comparison of changes in attitude within formal learning experiences involving continuous exposure to one or more instructional media, one phase of the research was devoted to assessing the impact on attitudes when a "new media" situation is interpolated between conventional experiences within one course. Two situations were studied in which programed instructional units were interpolated between conventional lecture approaches. In one of the two fifteen-week learning situations, attitude scales were administered two weeks prior to the programed unit, at the start of the unit, half way through the unit, at the completion of the unit, and two weeks following the unit. Findings from this phase of the study were as follows: 1) Programed instruction interpolated between conventional experiences is associated with pronounced changes in student attitudes; 2) Students tend to reflect more favorable attitudes toward the learning situation during programed instruction than during conventional instruction; 3) Differential attitudes during programed and conventional instruction are especially critical for high ability students; and 4) Special attention to student attitudes by the instructor is warranted during the transition from programed instruction to conventional instruction.

In the final and central portion of the present study, the total scale scores and subscores for 3,049 learners in seventy-two situations were analyzed. The initial analyses consisted of computing means and standard deviations for all subjects after they had been grouped into eleven media groups according to the instructional medium utilized in each learning situation. Several quadratic equations were then fitted to the data using least squares, and the desirability of including the third, fourth, and fifth powers of each score in the equation was explored. It was found that the square of the scores would accommodate the curvilinearity involved and the following equation was selected for the final analyses:

$$Y = B_1X+B_2X^2+C$$

Using the 1620 computer, a program was developed which divided the total variance among the five administrations into eight subdivisions, permitting the testing of seven hypotheses for each group and each score. The same program was utilized for the eleven groups as well as for the seventy-two situations. The eleven groups were as follows:

Programed Instruction
Educational Television
Programed Anatomy Laboratory
High School Language - Media Emphasis
High School Language - Conventional Laboratory
Small University Classes
Large University Classes
High School Language - Conventional Laboratory
High School Language - Media Emphasis
Junior High Language - Conventional Laboratory
Junior High Language - Media Emphasis

In all instances involving total scale scores, a significant contribution to the variation among individuals was made by either the linear equation or the curvilinear equation. In 34 of the 37 analyses involving area subscores, a comparable contribution to explanation in variation was found. It was concluded that it is possible to identify measurable trends in learner attitudes toward the learning situation throughout a variety of situations involving different instructional media.

In all analyses made, the regression coefficient representing the slope of the regression line of attitude with time was negative.

There was a tendency for attitudes toward the learning situation to become less favorable during formal learning experiences in all eleven instructional groupings. The "progressive disenchantment" reported in earlier investigations of direct television instruction is not unique to television as a medium of instruction.

In those instances in which new and unfamiliar media were used in the instructional situation, there appeared to be a "Hawthorne effect" in operation. In new and unfamiliar media situations, the decrease in favorability of attitudes during the initial portions of a learning experience was greater than during the later portions of the experience. This initial decrease was not as pronounced in instructional situations involving familiar instructional media such as small discussion classes or large lectures. This suggests the possibility of identifying procedures for an instructor who employs new media to maintain the relatively high initial attitude for the remainder of the learning experience.

Directions suggested for further research as the result of this study were as follows: 1) relating classroom procedures to change in attitudes within instructional media groups, 2) assessing the personal characteristics of learners whose attitude change data deviate substantially from the generalized equation for the group of which they are a part, 3) relating changes in attitude at different points in time during a learning experience to the final achievement outcomes of this experience, and 4) identifying the reasons which account for the decrease in favorability of attitudes during the learning experience.

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In those instances in which new and unfamiliar media were used in the instructional situation, there appeared to be a "Hawthorne effect" in operation. In new and unfamiliar media situations, the decrease in favorability of attitudes during the initial portions of a learning experience was greater than during the later portions of the experience. This initial decrease was not as pronounced in instructional situations involving familiar instructional media such as small discussion classes or large lectures. This suggests the possibility of identifying procedures for an instructor who employs new media to maintain the relatively high initial attitude for the remainder of the learning experience.

Directions suggested for further research as the result of this study were as follows: 1) relating classroom procedures to change in attitudes within instructional media groups, 2) assessing the personal characteristics of learners whose attitude change data deviate substantially from the generalized equation for the group of which they are a part, 3) relating changes in attitude at different points in time during a learning experience to the final achievement outcomes of this experience, and 4) identifying the reasons which account for the decrease in favorability of attitudes during the learning experience.

I. INTRODUCTION

Educators, psychologists, and philosophers have long been concerned with the nature and conditions of learning. The research effort stemming from this concern has been directed primarily toward the investigation of the intellective aspects of learning. Considerably less attention has been given to research concerning the non-intellective aspects of learning. Consequently, much less research evidence has been collected in support of theoretical formulations relating to instructional objectives in the affective domain than in the cognitive domain.

One important but relatively neglected non-intellective aspect of learning is the reaction of learners to conditions experienced in the learning situation. Reactions of learners are especially important when new instructional media are involved in a learning situation. Before the effectiveness of a new instructional medium can be accurately ascertained, some attention must be given to the extent to which learning outcomes are influenced by reactions of the learners to the medium. Reactions to media can either enhance or interfere with the achievement of instructional objectives. Reactions to media can also serve to encourage the learner to pursue additional learning in the situation, or to avoid it entirely.

The present study was undertaken to obtain evidence as to the nature of changes in learners' attitudes toward various aspects of learning situations during formal learning experiences. Aspects of learning investigated included attitude toward methods and media of instruction, attitude toward the subject matter studied, and feelings of expectation fulfillment experienced during the learning.

In this study, only limited attention was given to the extent to which intellective objectives within situations were achieved. This is not to imply that achievement of intellective objectives is unimportant, but rather that several stages of research will be necessary to understand the role of attitude change in the total learning process. The first stage, typified by the present investigation, involves the description and exploration of the attitude change phenomenon in a variety of situations. Once this phenomenon has been described and understood, it can then be related to the achievement of instructional objectives within any given situation.

Purposes

The central purpose of the study reported herein was to measure longitudinal changes in attitudes associated with learning experiences involving various instructional media. Subordinate to this general purpose were the following specific purposes:

1. To determine the relationship of the number of administrations of attitude scales during a learning experience to changes in attitude and to final attitude scale scores obtained by learners.

2. To determine the relation of attitude change during learning to selected personal characteristics of the learners and to certain environmental factors in the learning situation.

3. To measure attitude change when programed instruction is

interpolated between conventional learning experiences.

4. To estimate parameters of curves describing attitudinal changes by fitting linear and quadratic equations to longitudinal measurements of attitude obtained in situations involving different instructional media.

Overall Procedure

The accomplishment of the foregoing objectives required several varied research activities within the framework of the central purpose. These included 1) the development of an appropriate instrument to measure attitudes of learners, 2) implementation of a research design to assess the influence of several administrations of a scale on resulting scale scores, 3) assessment of attitude change in a situation in which programed learning was interpolated between conventional experiences, and 4) assessment of attitude change in a variety of learning situations involving different instructional media.

Several methodological difficulties were recognized at the outset of the investigation. Among them were the following:

1. Development of several forms of an attitude scale which would be a) sufficiently general in nature to cover a variety of instructional situations designed for learners of different ages and ability levels, and b) sufficiently free from compensating and biased errors to yield a meaningful assessment of attitude in a short time interval (six to eight minutes).

2. Willingness of instructors to forego class time to permit repeated administrations of the attitude scale to students in actual

learning situations.

3. Willingness of learners to make repeated responses to items on equivalent forms of a scale without becoming bored or impatient with the mensurational effort.

4. Administration of an appropriate number of scales sufficiently large to reflect changes but sufficiently small to avoid interference with reaching instructional objectives.

5. Attenuation in sample size through the elimination of subjects with incomplete longitudinal data.

6. Selection of learning situations reasonably representative of the use of a variety of instructional media.

7. Collection of sufficient descriptive data about the procedures used in each instructional situation to permit defensible grouping of situations thereby assuring some degree of homogeneity within groups.

8. Application of a statistical analysis which would permit isolation of variation among attitudes of learners and thereby allow the study of meaningful trends in attitudinal behavior.

In attempting to solve the foregoing problems, it was necessary to make many methodological decisions as the research progressed. Frequently these decisions had to be made on the basis of limited evidence. Whenever possible, however, some assessment was made of the extent to which the methodological difficulties were solved. These assessments are included in the discussion of the various findings.

More than one hundred learning situations and six thousand learners were involved in this investigation. Descriptions of the situations and learners are included in the five major sections of the report. In general, organization of the report parallels the order in which specific objectives of the study were stated. Section II concerns the development and analysis of the attitude scales used in the study. Section III is concerned with the relationship between the number of administrations of attitude scales and changes in scale scores. Section IV involves the study of the relation between changes in attitude during learning experiences and 1) personal characteristics of learners and 2) environmental factors in the learning situation. Section V concerns the assessment of attitude change when programed instruction is interpolated between conventional learning experiences. Section VI is concerned with fitting mathematical equations to the attitude change data for eleven groups of situations involving the use of different instructional media.

II. SCALE CONSTRUCTION AND ANALYSIS

Basic to the research project reported herein was the construction of a suitable instrument to measure attitudes of learners in situations involving different media of instruction. Review of the literature in the non-intellective areas of learning suggested two alternative approaches: 1) measurement of attitudes which were outcomes of the formal learning experience itself, or 2) measurement of various aspects of the formal learning experience. Since this research project was to involve several fields of subject matter, the first approach was discarded as unfeasible in that separate scales for each subject matter would be necessary. Additional review of the literature and several pilot studies indicated that those aspects of formal learning experiences offering most promise for research included attitude toward content of a course (exclusive of course outcomes), attitude toward methods of instruction, attitude toward expectation fulfillment, and attitude toward the teacher. Of these four aspects, the first three were selected for inclusion in the study. Attitude toward the teacher was eliminated since some situations to be investigated involved programed instructional situations with no teacher. In addition, it was felt that inclusion of this aspect would pose such a threat that many teachers would not participate in the research. Thus, the three attitude areas selected for investigation included method, expectation fulfillment, and content.

From the examination of existing attitude scales and from taped interviews with students who had recently completed courses involving educational television and programed instruction, more than 500 statements of varying degree of favorability and unfavorability were prepared and edited for clarity, brevity, and consistency. The statements were typed on separate cards and judged by ten judges according to Thurstone's Method of Equal Appearing Intervals (1929). Scale values and indices of ambiguity were computed for each statement.

Since the scale being constructed was to be administered five times during each learning experience, it was essential that it be a short and administratively feasible instrument. Several try-outs of experimental versions indicated that the maximum number of items to which learners of varying age and ability could respond comfortably in an eight minute period was twenty-six. This number was selected as the number of items to be included in the final scale.

Items for the final scale were selected according to their content (method, expectation, and content), their scale value (distribution of favorability and unfavorability), and their index of ambiguity. The distribution of statements in the final scale by area and favorability is shown in Table 1.

Table 1

Distribution of Final Scale Items by Area and Favorability

Area	Proportion	Favorable	Unfavorable	Total
Method	.60	8	8	16
Expectation	.20	2	3	5
Content	.20	3	2	5
Total	1.00	13	13	26

Five parallel forms of the scale were constructed by rearranging key words and using alternate words of the same meaning as those in the original version. Approximately ten parallel forms of the 26-item scale were devised and tested in experimental form. The five forms yielding most similar results were chosen for the research project.

The final twenty-six items for each of the five forms of the scale were arranged in the well-known Likert format (1932) and an appropriate set of directions was prepared. For scoring purposes, weights of 4, 3, 2, 1, and 0 were assigned to responses of Strongly Agree through Strongly Disagree for positively stated items, and weights of 0 through 4 were assigned these responses for negatively stated items. The five parallel forms of the scale are shown in Appendix A.

The scales shown in Appendix A were administered in sixty-seven of the learning situations investigated. A single form of a somewhat similar scale was administered in forty-one language learning situations. This scale was designed to yield measures of attitude toward language laboratory experiences, language films, language textbooks, and language content. Only one form of this scale was constructed and is shown in Appendix B.

Item Analysis

Although much experimental work had gone into the preparation of the five scale forms constructed for this project, it was felt desirable to obtain evidence of their effectiveness in several situations from the project itself. Responses of random samples of subjects in the first administration of the scale in five situations were selected for item analysis. The purposes of the item analyses were those of 1) determining the discrimination ability of each item, and 2) determining the correctness of the area classification of the item. The coefficient of correlation between each item and each of the subscale scores was computed using Flanagan's Table for Item Analysis (1939). In interpreting the results of the item analysis, two assumptions were made: 1) a good item will correlate positively with its subscale or area score, and 2) a good item will correlate as high or higher, on the average, with its own subscale or area score than with other subscale scores. Results of the item analyses for the two scales are shown in Tables 2 and 3. It should be noted that the data in Table 2 represent all five forms of the scale in equal numbers in each of the four situations. Data in Table 3 represent one form only. Inspection of these tables reveals that the item analysis evidence supports the classification of the items according to subscales or areas. It also indicates that almost all items have considerable discriminatory ability. All items were scored in all subsequent administrations.

Reliability

To obtain evidence of the reliability of the scales used in this research, several estimates of reliability in various situations were obtained and are shown in Table 4. The administration or administrations from which the data were obtained are indicated. Since all five forms of the scale were administered in counterbalanced order throughout the research, reliability estimates were computed on all five forms combined. The forms were represented in equal proportions within each administration for the data shown in Table 4. The Spearman-Brown estimates were obtained from odd and even numbered items within each form.

Inspection of Table 4 indicates satisfactory, although not high, reliability for each area. Although many of the coefficients are less than .90, it should be recalled that all five forms are represented and the data can therefore be considered as underestimates of the reliability of individual forms. The relative consistency of responses to the eight-minute scale throughout ten to fifteen week learning experiences is shown in the several test-retest situations. As expected, correlations between successive administrations increased slightly throughout the learning experiences.

Table 2

Item Correlations with Each Area Score in Four Situations* for the General Attitude Scale

Item No.	Area	Method				Content				Expectation			
		I	II	III	IV	I	II	III	IV	I	II	III	IV
1	Method	.83	.30	.80	.83	.45	.00	.30	.24	.81	-.40	.75	.60
2	Expectation	.74	.45	.55	.50	.37	.62	.32	.40	.77	.60	.77	.85
3	Method	.51	.68	.72	.76	.45	.16	.00	.02	.29	.15	.40	-.35
4	Method	.93	.54	.91	.88	.56	.60	.36	.46	.88	.37	.77	.42
5	Content	.37	.19	.37	-.23	.23	.61	.75	.46	.00	.33	.22	-.35
6	Method	.83	.67	.73	.78	.27	.12	.30	.20	.48	.17	.22	.39
7	Expectation	.82	.51	.83	.49	.59	.68	.37	.41	.74	.73	.82	.78
8	Method	.45	.36	.28	.20	-.65	.36	.40	-.08	.27	.34	-.23	-.19
9	Content	.46	.28	.06	.11	.64	.62	.72	.68	.43	.52	.04	.19
10	Method	.82	.58	.30	.60	.32	.20	.58	.22	.53	.01	-.14	.30
11	Method	.90	.78	.91	.89	.63	.32	.39	.40	.93	.34	-.80	.04
12	Expectation	.58	.30	.86	.87	.58	.30	.47	.42	.68	.35	.99	.91
13	Content	.71	.52	.64	.61	.80	.80	.80	.90	.59	.35	.60	.64
14	Method	.23	.23	.06	.30	.00	.21	.53	.04	-.32	-.08	.00	-.14
15	Method	.67	.73	.63	.70	.16	.59	.21	.40	.81	.59	.28	.34
16	Method	.46	.62	.64	.64	-.23	.55	.14	-.17	.26	.36	.39	.34
17.	Method	.53	.68	.63	.74	.47	.62	.61	.50	.62	.45	.53	.52
18	Method	.90	.82	.93	.88	.50	.72	.50	.40	.72	.36	.82	.60
19	Expectation	.70	.43	.50	.52	.32	.57	.56	.30	.90	.81	.87	.89
20	Method	.60	.54	.54	.53	.50	.60	.23	.16	.46	.35	.57	.39
21	Method	.85	.75	.88	.90	.63	.64	.67	.70	.81	.47	.84	.80
22	Method	.90	.73	.91	.88	.46	.42	.28	.40	.87	.27	.91	.50
23	Content	.71	.33	.57	.30	.75	.63	.49	.72	.39	.48	.57	.62
24	Expectation	.90	.51	.84	.88	.54	.29	.49	.46	.93	.59	.99	.91
25	Method	.64	.40	.48	.60	.19	.40	.13	.24	.23	.27	.34	.26
26	Content	.44	.00	.23	.72	.62	.12	.66	.84	.53	.00	.23	.58

*I - First-Year German Students, C. S. U., N=100.

II - Airmen at Lowry Air Force Base, N=75

III - ETV Students, University of Missouri, N=100

IV - English Composition Students, C. S. U., N=96

Table 8

Item Correlations with Each Area Score for the Language Attitude Scale

N=100

Item No.	Laboratory	Films	Content	Textbook	r with own scale
1	.82*	.02	-.07	-.48	.82
2	.72*	.27	.00	-.30	.72
3	-.27	.07	-.05	.81*	.81
4	.69*	-.02	.15	-.66	.69
5	.76*	-.19	-.17	-.35	.76
6	.11	.87*	.35	.48	.87
7	.62*	-.34	.00	-.63	.62
8	-.57	-.08	.00	.75*	.75
9	-.23	.77*	.34	.05	.77
10	.52	.03	.63*	-.19	.63
11	.65*	.33	.00	-.28	.65
12	.28	.11	.84*	-.25	.84
13	-.31	.89*	.12	.24	.89
14	.64*	-.18	.05	.08	.64
15	.42	.48	.78*	.05	.78
16.	.72*	-.14	.07	-.28	.72
17	.40	.44	.71*	.38	.71
18	.16*	.05	.33	.11	.16
19	-.17	.08	.02	.83*	.83
20	.81*	.00	-.03	-.29	.81
21	.81*	-.01	.35	.31	.81
22	-.46	.87*	.30	.45	.87
23	-.35	.06	-.08	.83*	.83
24	.84*	-.23	.10	-.37	.84
25	.42	.34	.82*	.35	.82
26	.62*	-.14	.15	-.72	.62

*Area in which item was originally classified.

Table 4

Reliability Estimates of the Total
Attitude Scale and Three Sub-Scales

Situation	Type	Coefficient			
		Method	Content	Expectation	Total
33 English Students, CSU					
(small class)	Spearman-Brown	.80	.67	.87	.91
100 Airmen, Lowry AFB	Spearman-Brown	.78	.74	.46	.85
50 ETV Students, U of Mo.	Spearman-Brown	.91	.72	.79	.86
50 English Students, CSU					
(large class)	Spearman-Brown	.91	.47	.49	.86
103 ETV Students,					
U of Colo.	Spearman-Brown	.64	.46	.65	.82
31 Beginning German					
Students, CSU	Spearman-Brown	.82	.58	.71	.94
33 English Students, CSU	Test Retest				
(small class)	1st & 2nd admin	.72	.76	.39	.78
Two-week Interval	2nd & 3rd admin	.80	.75	.86	.88
Between Administra-	3rd & 4th admin	.74	.93	.89	.89
tions	4th & 5th admin	.79	.81	.80	.86
70 Airmen, Lowry AFB	Test Retest				
Programed Instruction	3rd & 4th admin	.81	.81	.78	.84
One-week Interval					
26 Airmen, Lowry AFB					
Lecture	1st & 2nd admin	.66	.86	.58	.72
Two-week Interval					
164 ETV Students, U of Mo.	Test Retest				
Three-week Interval	1st & 2nd admin	.72	.57	.58	.61
General Psychology	2nd & 3rd admin	.79	.71	.80	.85
	3rd & 4th admin	.76	.69	.77	.81
	4th & 5th admin	.81	.79	.79	.86
50 English Students, CSU	Test Retest				
Two-week Interval	1st & 2nd admin	.53	.57	.80	.81
	2nd & 3rd admin	.80	.62	.69	.82
	3rd & 4th admin	.89	.78	.62	.89
	4th & 5th admin	.89	.75	.82	.89
55 ETV Students, U of Mo.	Test Retest				
Three-week Interval	1st & 2nd admin	.73	.70	.56	.74
Agricultural Economics	2nd & 3rd admin	.84	.71	.42	.88
	3rd & 4th admin	.82	.69	.86	.88
	4th & 5th admin	.81	.83	.82	.93
31 Beginning German	Test Retest				
Students, CSU	1st & 2nd admin	.78	.59	.70	.94
Two-week Interval	2nd & 3rd admin	.76	.58	.71	.88
	3rd & 4th admin	.80	.87	.86	.92
	4th & 5th admin	.94	.86	.88	.95

Data in Table 4 represent reliability estimates for the five forms of the general attitude scale only. Estimates of the reliability of the language attitude scale, based on responses of fifty high school students, were as follows:

	Labs	Films	Content	Text	Total
Spearman-Brown	.80	.96	.81	.60	.89
Test-retest (7 week interval)	.82	.88	.84	.72	.91

Scale Homogeneity

The scales used in this research project were designed to yield a subscore for each of several areas. In general, data from the item analyses of the scales supported this approach. To determine in a more precise way the appropriateness of obtaining a separate score for each area, four tests of homogeneity were made, three for the general scale and one for the language attitude scale. Data from first administrations only were used in the homogeneity analyses.

The analysis for homogeneity made here involves the application of the analysis of variance to reactions of subjects to items within areas versus reactions to items among areas. The test was developed by Heidt (1949). In general, the data required include all possible inter and intra area coefficients of correlation between odd and even numbered item subscale forms for each area. From these data, two F-tests are possible, one for all areas tested simultaneously and another for each possible pair of areas. The tests for homogeneity are shown in Tables 5 through 8.

The formula for the test for homogeneity is

$$F = \frac{1 + \bar{r}_w - 2(\bar{r}_a)}{1 - \bar{r}_w}$$

where: $\bar{r}_w$ = average intra area coefficient

$\bar{r}_a$ = average inter area coefficient

and the averages have been obtained from

$$Z = \frac{1}{2} \log_e \frac{1 + r}{1 - r} .$$

Degrees of freedom associated with the F-value are $(N - 1)(K - 1)$ for the numerator and $(N - 1)$ for the denominator where N is the number of subjects and K the number of areas.

From Tables 5 through 7 it can be seen that the twenty-six items in the total scale deviate significantly from homogeneity. In addition, considerable evidence is found indicating that the three areas are separate from each other. From Table 8 it can be seen that all four areas of the language attitude scale are heterogeneous with respect to each other. Separate area scores were therefore maintained throughout all subsequent analyses of the data for this research project.

In summary, two scales were developed on which to base the research project reported herein. One scale, prepared in five parallel forms for general use was designed to measure attitude toward methods of instruction, attitude toward subject matter content, and attitude toward expectation fulfillment. The other scale, prepared in one form only, for use in assessing attitudes in foreign language teaching, was designed to measure attitude toward language laboratories, attitude toward films, attitude toward content, and attitude toward textbooks. Considerable evidence was obtained which supported the item classifications within the scales, the reliability of the scales, and the appropriateness of obtaining separate subscale scores for each area included in the scales.

Table 5

F-Tests for Homogeneity, General Attitude Scale ETV Students, University of Missouri

N=50

Area		Method	Content		Expectation	
		Even	Odd	Even	Odd	Even
Method	Odd	.84	.54	.29	.82	.66
	Even		.48	.45	.79	.67
Content	Odd			.56	.49	.28
	Even				.40	.31
Expectation	Odd					.66

F-tests

Total $$F = \frac{1 + \bar{r}_w - 2(\bar{r}_a)}{1 - \bar{r}_w} = \frac{1 + .71 - 2\ (54)}{1 - .71} = 2.12^{**} \quad (\text{d.f.} = 98,\ 49)$$

Method and Content, F = 3.27** (d.f. = 49, 49)

Method and Expectation, F = 1.20

Content and Expectation, F = 2.25**

* Significant at the .01 level.
**Significant at the .05 level.

Table 6

Tests for Homogeneity, General Attitude Scale
Lowry Air Force Base

N=75

Area		Method Even	Content Odd	Content Even	Expectation Odd	Expectation Even
Method	Odd	.638	.322	.468	.190	.442
	Even		.356	.568	.192	.466
Content	Odd			.586	.175	.397
	Even				.482	.517
Expectation	Odd					.302

F-tests

Total $$F = \frac{1 + \bar{r}_w - 2\ (\bar{r}_a)}{1 - \bar{r}_w} = 1.56^{*} \quad (\text{d.f.} = 148, 74)$$

Method and Content, $F = 1.93^{**}$ (d.f. = 74, 74)

Method and Expectation, $F = 1.21$

Content and Expectation, $F = 1.62^{*}$

* Significant at the .05 level.
**Significant at the .01 level.

Table 7

F-Tests for Homogeneity, General Attitude Scale
Large English Class, Colorado State University

N=50

Area		Method	Content		Expectation	
		Even	Odd	Even	Odd	Even
Method	Odd	.331	.310	.425	.437	.616
	Even		.268	.477	.457	.565
Content	Odd			.307	.180	.229
	Even				.264	.383
Expectation	Odd					.328

F-Tests

$$\text{Total} \qquad F = \frac{1 + \bar{r}_w - 2\bar{r}_a}{1 - \bar{r}_w} = 1.69^* \qquad (\text{d.f.} = 98,\ 49)$$

Method and Content, F = 2.46** (d.f. = 49, 49)

Method and Expectation, F = 1.69*

Content and Expectation, F = 1.15

* Significant at the .05 level.
**Significant at the .01 level.

Table 8

F-Tests for Homogeneity
Language Attitude Scale

N=50

Area		Labs		Films		Content		Textbooks	
		Odd	Even	Odd	Even	Odd	Even	Odd	Even
Labs									
	Even	.671							
Films	Odd	-.016	.128						
	Even	.071	.160	.964					
Content	Odd	.154	.340	.236	.459				
	Even	.152	.348	.299	.524	.732			
Textbooks	Odd	-.324	.016	-.134	.080	-.250	-.109		
	Even	.228	-.061	-.107	-.226	.114	.053	.425	

F-Tests

Total $F = \frac{1 + \bar{F}_W - 2\bar{F}_A}{1 - F_W} = 7.531^{**}$ (d.f. = 196, 49)

Labs and Films F = 3.695** (d.f. = 49, 49)

Labs and Content F = 4.972** (d.f. = 49, 49)

Labs and Textbooks F = 4.186** (d.f. = 49, 49)

Films and Content F = 10.063** (d.f. = 49, 49)

Films and Textbooks F = 12.899** (d.f. = 49, 49)

Content and Textbooks F = 3.840** (d.f. = 49, 49)

**Significant at the .01 level.

III. ATTITUDE CHANGE AS A FUNCTION OF THE NUMBER OF SCALES ADMINISTERED

The primary design of this research project involved five administrations of an attitude scale to groups of learners in a variety of formal learning situations. Inherent in this design is the assumption that the administrations of the scale are independent of each other. To the extent to which this assumption is correct, then it can be inferred that changes in score from one administration to the next are reflections of actual changes in attitude of the subjects. To the extent to which this assumption is incorrect, the results of the investigation become confounded by "pretest sensitization" and are difficult, if not impossible to interpret. Methodologically, it was considered essential in the present research to assess the extent to which changes in attitude reflected in repeated administrations of the scale might be a function of the number of times the scale was being administered. A review of literature related to this phase of the present research project was made and is summarized in the following paragraphs.

Background

One of the most frequently utilized designs in attitude change research is that of administering an attitude scale as a pretest and readministering the same scale, or its equivalent, one or more times as a post-test. In most attitude change studies published before 1950, pretest and post-test scales were administered to one control group and to one or more experimental groups. This procedure was followed to assess the influence on attitude of some intervening treatment to which the experimental group or groups had been exposed. In 1949, Solomon presented several criticisms of the one-control one-experimental group pretest post-test design, and advocated the use of a design that would reflect the possible influence of pretest sensitivity on subsequent responses. He pointed out that the use of a pretest attitude scale conceivably could affect the outcome of subsequent scale administrations and thereby confound the results of the research. To alleviate this confounding he proposed that attitude change research be conducted using four groups as follows:

Group One	pretest	treatment	post-test
Group Two	pretest	no treatment	post-test
Group Three		treatment	post-test
Group Four			post-test only

This design received favorable comment from Campbell in 1957 and again in 1963. In addition, Lana (1959) referred to the Solomon design as "the most practicable and complete of the six basic designs reviewed by Campbell."

In a research report published with his original discussion of pretest sensitization, Solomon (1949) found significant influence of pretest spelling examinations on subsequent learning outcomes. Lana (1959), however, found no interaction from pretesting attitudes when the attitudes involved were of little concern to the subjects. In 1960, Lana and King found significant interaction between pretest and treatment where the treatment resulted in learning by the subject. This led them to conclude that pretest sensitization and influence on subsequent administrations follows a continuum reflecting the degree of involvement of the subjects in the treatment itself. Edling (1963), using an extension of the Solomon design, found significant pretest sensitization and attenuating effect on subsequent attitude measurements in a film learning experiment. His message to the experimental subjects was designed to induce change and would probably fall at the extreme "involvement" segment of the aforementioned continuum.

Thus, it has been rather well established that the content of an experimental treatment interpolated between attitude scale administrations is an important aspect of pretest sensitization, but no research has been directed specifically toward the relationship of attitudes toward method of presenting the experimental treatment to pretest sensitization. Likewise, no assessment has been made of the relationship between expectation fulfillment during the treatment and pretest sensitization. These characteristics, attitude toward method and expectation fulfillment, are especially important in researches designed to measure attitude change where new educational media are involved in the treatment. For example, several authors have reported "progressive disenchantment" (Macomber and Siegel, 1960) and "decreasing interest in the subject matter" (Stake and Thompson, 1962) in the new media experiments, but little consideration has been given to the possible influence of repeated testing on measured attitudes as an explanation of results.

The foregoing results emphasized the importance of studying the influence of pretest sensitization on results yielded by the research design embodied in this study. Four experimental situations were therefore identified in which the sensitization phenomenon could be investigated. These situations were chosen to be more or less representative of different media of instruction and were considered as separate from other aspects of the overall research. It was considered desirable to replicate the experimental situations whenever possible as well as to investigate pretest sensitivity with respect to both scales and all subscales.

Situation One, University of Missouri

At the time the present study was initiated, the University of Missouri was engaged in a well-developed program involving educational television. This learning situation was well suited to the study of pretest sensitization since there were several sections available in each of two courses, General Psychology and Agricultural Economics, where students in each course received the same video-taped lectures. Students in both courses met twice per week for a fifteen-week period which extended from September, 1963, through January, 1964. Each class period lasted fifty minutes. Such a setting permitted the investigation of attitude change in an ETV learning situation where instructor and course content variables were held constant.

Subjects

One thousand and nine students at the University of Missouri participated in this phase of the study. Students ranged in class standing from freshman through senior and were enrolled in either Agricultural Economics or General Psychology. Eight class sections totaling two hundred eighty-six students comprised the course in Agricultural Economics whereas the course in General Psychology included fifteen class sections totaling seven hundred twenty-three students. Since only those students with complete data were included in the analysis, the original total was reduced to seven hundred.

Method

Sections of students in each of the two courses were randomly divided into six groups. The five equivalent forms of the twenty-six item attitude scale were then administered in counter-balanced order to the various groups at five equally spaced intervals during the semester according to the design shown in Table 9.

Table 9

Administration Design for Six Groups
Involved in the Pretest Sensitization Experiment

Group	Administration 1st	2nd	3rd	4th	5th
I					X
II				X	X
III			X	X	X
IV		X	X	X	X
V	X	X	X	X	X
VI	X				X

Group I in each course received only one administration which took place at the end of the 15 week course. Groups II and VI received two administrations of the scales; Group II at the end of the twelfth and fifteenth weeks and Group VI at the end of the third week and again at the end of the fifteenth week. Group III received three administrations; the first at the end of nine weeks, the second after the twelfth week and the last at the end of the fifteenth week. Group IV received four administrations; one each at the end of the sixth week, the ninth week, the twelfth week and the last after the fifteenth week. Group V received five administrations; one at each three-week interval during the course.

Results

The mean attitude scale scores by group and area for both General Psychology and Agricultural Economics are shown in Tables 10 and 11. To determine the significance of the differences among the mean attitude scale scores by administration for the two courses, the analysis of variance was applied to the data. Since these data represent repeated administrations of attitude scales to the same subjects, the source of variation attributable to "individuals" was isolated and tested separately. In all instances, this source of variation was found to be significant, indicating that correlation existed among the scores obtained for the individual students. The significance of the "between administrations" source of variation is shown in the column of F-values in Tables 4 and 5. From these values it can be noted that the majority of the groups showed a significant change in attitudes during the two learning experiences.

Inspection of the means reveals that in all instances the mean scores for the last administration were lower than those for the first administration. The majority of the decreases in favorability of attitudes occurred during the first half of each course. In some instances, however, increases in favorability of attitudes did occur between adjacent administrations of the scales.

Of primary importance to this phase of the present research project is the relationship between the mean attitude scale scores for Group I and those for the last administrations of the other five groups. Since Group I was administered the scale only once, this administration was free from the effects of pretest sensitization and should therefore reflect the reactions of the students without pretest bias. To the extent to which previous administrations attenuate subsequently administered scale scores, the mean scores of Group I should be higher than the mean scores of the other groups. To test the relationship of Group I mean scores and the final administration mean scores of the other groups, independent tests of significance were computed between Group I and each of the other five group means. Significant

Table 10

Mean Attitude Scale Scores by Group, Area, and Administration
General Psychology

Group	N	Area	Administration 1st	2nd	3rd	4th	5th	F
I	76	Method					27.3	
		Expectation					8.3	
		Content					11.9	
		Total					47.6	
II	72	Method				29.6	28.7	2.52
		Expectation				9.1	8.8	1.10
		Content				12.9	12.1	7.06**
		Total				51.6	49.6	4.35*
III	69	Method			34.1	30.6	30.1	16.20**
		Expectation			10.7	9.5	8.9	25.01**
		Content			13.6	12.2	12.0	7.72**
		Total			58.4	52.3	51.0	24.38**
IV	32	Method		33.6	33.1	32.8	32.5	.38
		Expectation		10.1	10.9	10.3	10.3	1.22
		Content		13.0	13.1	12.7	12.5	.60
		Total		56.8	57.1	55.7	55.4	.50
V	164	Method	33.3	32.0	31.4	30.5	30.8	8.70**
		Expectation	11.0	10.3	10.0	9.5	9.4	15.18**
		Content	13.4	12.4	12.5	11.8	12.0	16.29**
		Total	57.7	54.8	53.8	51.8	52.4	16.78**
VI	80	Method	30.8				26.4	17.88**
		Expectation	10.3				7.8	20.02**
		Content	13.8				12.0	18.93**
		Total	54.9				46.7	25.79**

* Between administrations significant at .05 level.
**Between administrations significant at .01 level.

Table 11

Mean Attitude Scale Scores by Group, Area, and Administration
Agricultural Economics

			Administration					
Group	N	Area	1st	2nd	3rd	4th	5th	F
I	21	Method					32.0	
		Expectation					10.2	
		Content					10.9	
		Total					53.0	
II	28	Method				36.1	34.6	.52
		Expectation				11.4	11.7	.09
		Content				12.5	13.1	.54
		Total				59.9	59.4	.02
III	39	Method			32.3	31.8	30.5	2.18**
		Expectation			10.5	10.1	9.8	1.20
		Content			11.6	11.5	10.7	1.94**
		Total			54.4	53.4	50.9	3.18**
IV	38	Method		37.8	35.7	34.3	33.1	10.59**
		Expectation		12.5	11.1	10.6	10.1	12.59**
		Content		13.0	11.8	11.7	11.8	3.87*
		Total		63.2	58.6	56.6	54.9	3.65*
V	55	Method	34.6	35.8	33.7	32.7	32.5	5.66**
		Expectation	11.5	11.3	10.4	10.4	10.4	4.02**
		Content	12.6	12.2	11.6	11.6	11.8	3.22**
		Total	58.6	59.3	55.7	54.7	54.7	6.77**
VI	26	Method	35.6				31.8	4.38*
		Expectation	11.4				10.2	2.67
		Content	11.7				11.0	1.18
		Total	58.7				53.0	3.93

* Between administrations significant at .05 level.
**Between administrations significant at .01 level.

differences were found between Groups I and IV and between Groups I and V for all areas in General Psychology and between Groups I and II for the expectation are in Agricultural Economics. It should be noted, however, that in those instances where significant differences were found, each difference was in the opposite direction than would be predicted from the pretest sensitization hypothesis. In other words, the group responding to the scale only once reflected less favorable attitudes than the groups who had responded previously to the scale.

Situation Two, University of Rochester

Ten students enrolled in a first-year programed course in Spanish at the University of Rochester constituted Situation Two in the pretest sensitization investigation. The students had had no previous foreign language training. The "automated program" used consisted of 7,000 frames divided into sixty units. The program was designed to be covered in one semester. At the beginning of the course each student was issued a program, a portable tape recorder, and a head set. The head set permitted the student to hear the recorded tape as well as his own verbal response. The learning experience took place in a language laboratory which the student scheduled according to his available time. Once a week a group classroom session (display session) was held. At the display session each student indicated his progress, asked questions and participated in a group discussion conducted in Spanish. The average time to complete the program was fifty-six hours.

Method

The ten students enrolled in the course were divided into two groups at random. Group I was administered the scale at the end of the entire course only but Group II was administered the scale twice, once at the end of the first two weeks and again at the end of the course, thirteen weeks later.

Results

In Tables 12 and 13 are shown the mean scores by area as well as the corresponding t-values indicating the significance of differences between means. From these data it can be seen that no significant differences were found. However, there was a slight increase in favorability of three mean scores in Table 12. From Table 13 it can be seen that the group not pretested scored slightly higher than the pretested group on the method area, but slightly lower on the content and expectation areas. Thus, on the basis

Table 12

Significance of Changes in Attitude Scores
Between First and Second Administrations

N=5

Area	First Ad Mean	Second Ad Mean	"t"
Method	51.4	52.2	1.61
Content	17.2	18.6	1.23
Expectation	17.8	17.8	00
Total	86.4	88.6	1.04

Table 13

Significance of Differences Between Final Attitude Scores
for Group Taking Scale Once (I)
for Group Taking Scale Twice (II)

Area	Mean Group I N=5	Mean Group II N=5	t
Method	56.4	52.2	.83
Content	18.4	18.6	.12
Expectation	17.2	17.8	.18
Total	92.0	88.6	.42

of this very limited evidence, no support can be found for a consistent pattern of pretest sensitization.

Situation Three, Colorado State University

At Colorado State University 164 students enrolled in a course entitled Principles of Education participated in Situation Three of the pretest sentization phase of this research project. The course covered twelve weeks and the total class met twice each week in fifty-minute sessions to hear lectures given by one of five instructors. Once each week sections of twenty-five students each met to discuss the lecture content and conduct individual projects.

Method

The attitude scale was administered to seventy-five students (three discussion sections) at the end of the course only and to forty-six students (two discussion sections) at the end of the second week and at the end of the course also. Students were unaware that two groups were involved in the investigation.

Results

Mean scores for the two groups by area are shown in Table 14. Also included in this table are the t-values resulting from the comparison of the two administrations to the same group and the t-values resulting from the comparison of the final administrations to both groups. From the data in Table 14 it can be seen that the attitudes declined significantly in all areas in this course. However, there was no significant difference between the mean scores for any area of the pretested group and of the non-pretested group. In fact, the group receiving the final administration only scored slightly higher than the group receiving both administrations.

As in the case of the two previous situations, no evidence was found in

Table 14

Mean Differences by Group and Administration
Pretest Sensitization, Situation Number Three

Group	Area	Administration First	 Second	t for Groups I & II
I	Method		34.1	.52
N=75	Expectation		9.9	.94
	Content		10.9	.26
	Total		53.0	.27
				t for Administrations
II	Method	36.7	32.9	4.33**
N=46	Expectation	10.6	9.1	3.11**
	Content	11.9	10.7	3.10**
	Total	59.2	52.3	5.16**

**Significant at the .01 level.

Situation Three in support of a relationship between attitude change and the number of scales administered.

Situation Four, Junior High School Language Instruction

The fourth situation designed for the investigation of the relationship of number of scales administered to subsequent scale scores involved fourteen junior high school teachers and forty-six of their classes in the Jefferson County Public Schools, District R-1, Lakewood, Colorado. The teachers administered the foreign language attitude scale (Form JC, shown in the Appendix) in varying patterns one, two or three times throughout the school year. In general, administrations were conducted at points representing intervals of seven weeks between adjacent administrations. Administrations were arranged such that each of the fourteen teachers administered the scale to at least one of his classes at the end of the school year, and to at least one other of his classes more than once during the year. Assignment of adjacent dates to classes taught by the same teacher was made at random. Since some of the teachers taught two sections of the same course and these sections involved identical administration patterns, results from these sections were pooled for the analysis.

The mean subscale and total scale scores for all teachers and their classes are shown in Tables 15 through 19. Inspection of these tables reveals the particular administration pattern followed by each teacher. Before sections of the same course taught by the same teacher were pooled, Teacher A was represented by four classes, D by five, E by five, F by four, H by four, I by three, and N by four. Pooling some of the data for these teachers yielded the thirty-nine class situations shown in each table. This phase of the study involved one thousand and ninety-seven pupils.

In analyzing the data in Tables 15 through 19, the hypothesis that pretesting depresses subsequent scale scores was tested. This hypothesis was chosen because of the findings of Lana and King (1960) and because it had been noted that attitudes tend to decline in previous investigations (Macomber and Siegel, 1960, and Edling, 1963). It was considered important in the present investigation to assess as accurately as possible the extent to which scores from scales administered late in a learning experience might be low because of unfavorable attitudes or because of the influence of previous administrations. Although considerable evidence was amassed in Situations one, Two, and Three that pretest sensitivity did not result in appreciable attenuation with the attitude scale for general use, no evidence was presented which involved the foreign language teaching scale.

In evaluating the pretest sensitization hypothesis involved in the foregoing paragraph, it was postulated that if pretest sensitization were depressing scores on subsequent administrations, then the subsequent scores would be lower, on the average, than those obtained by comparable subjects responding to the scales at the same point during the learning experience but responding to the scale for the first time. Thus for Teacher A in Table 15, the lowest mean score, 22.50, resulted from the class to which the scale was administered only once and that at the end of the course. The number of times the mean of the second administration was lower than the mean of the single final administration was counted, with the following results: Table 15, nine times; Table 16, ten times; Table 17, ten times; Table 18, thirteen times; and Table 19, nine times.

Table 15

Mean Laboratory Attitude Scores of Junior High Students Administered Varying Numbers of Scales

Language	N	Teacher	Administration				
			1st	2nd	3rd	4th	5th
French	16	A	23.44				23.00
French	55	A					22.50
French	20	A	36.50				30.20
Spanish	34	B					31.35
Spanish	31	B	37.80				31.70
Spanish	26	C					18.00
Spanish	22	C	22.77				17.77
French	26	D	40.00				36.85
French	25	D				36.48	33.08
French	27	D	29.62				27.88
French	50	D					26.12
French	17	E	43.41				35.17
Spanish	34	E	41.23				34.06
Spanish	60	E					33.01
Spanish	22	E				31.95	33.82
Spanish	50	F					26.70
Spanish	25	F	26.64				21.60
Spanish	19	F	25.89				27.10
French	14	G	37.36	35.00			
French	6	G					33.50
French	33	H					24.12
French	43	H	25.60				23.40
Spanish	46	I					25.05
Spanish	31	I	27.90				24.97
French	16	J	21.75				15.19
French	15	J	35.47				23.20
French	18	J					14.16
Spanish	22	K					15.95
Spanish	29	K	34.52				22.83
Spanish	25	L				32.72	22.60
Spanish	24	L	36.49				34.83
Spanish	21	L					31.57
Spanish	30	L			34.50	33.83	30.13
Spanish	16	M	27.81				20.44
Spanish	13	M					25.46
Spanish	22	M				28.09	20.91
Spanish	60	N					28.60
Spanish	21	N	23.70	22.20			
Spanish	33	N	39.90				32.40

Table 16

Mean Films Attitude Scores of Junior High Students Administered Varying Numbers of Scales

Language	N	Teacher	Administration 1st	2nd	3rd	4th	5th
French	16	A	12.94				11.70
French	55	A					10.23
French	20	A	9.70				8.70
Spanish	34	B					14.15
Spanish	31	B	11.03				13.35
Spanish	26	C					6.15
Spanish	22	C	11.18				5.50
French	26	D	11.35				12.92
French	25	D				11.16	12.08
French	27	D	10.92				11.44
French	50	D					9.94
French	17	E	9.94				12.18
Spanish	34	E	19.59				10.21
Spanish	60	E					10.26
Spanish	22	E				10.36	9.68
Spanish	50	F					11.42
Spanish	25	F	10.88				12.08
Spanish	19	F	11.05				11.47
French	14	G	8.50	9.29			
French	6	G					7.83
French	33	H					8.85
French	43	H	8.10				9.58
Spanish	46	I					8.92
Spanish	31	I	8.00				8.39
French	16	J	8.50				8.88
French	15	J	10.73				8.33
French	18	J					8.72
Spanish	22	K					8.31
Spanish	29	K	7.72				9.83
Spanish	25	L				11.64	12.80
Spanish	24	L	8.71				9.25
Spanish	21	L					11.33
Spanish	30	L			11.60	13.67	12.70
Spanish	16	M	9.38				9.38
Spanish	13	M					7.78
Spanish	22	M				9.23	8.59
Spanish	60	N					11.20
Spanish	21	N	8.72	8.00			
Spanish	33	N	10.20				10.10

Table 17

Mean Content Attitude Scores of Junior High Students Administered Varying Numbers of Scales

Language	N	Teacher	Administration 1st	2nd	3rd	4th	5th
French	16	A	15.11				13.01
French	55	A					12.49
French	20	A	15.90				14.40
Spanish	34	B					15.44
Spanish	31	B	13.19				12.38
Spanish	26	C					8.96
Spanish	22	C	13.68				9.54
French	26	D	16.50				16.23
French	25	D				14.48	14.52
French	27	D	14.70				10.07
French	50	D					12.40
French	17	E	14.53				15.08
Spanish	34	E	12.56				11.50
Spanish	60	E					12.62
Spanish	22	E				13.09	13.18
Spanish	50	F					11.94
Spanish	25	F	15.92				14.24
Spanish	19	F	13.68				12.89
French	14	G	15.57	12.21			
French	6	G					12.50
French	33	H					11.75
French	43	H	11.65				11.42
Spanish	46	I					10.90
Spanish	31	I	13.55				12.45
French	16	J	11.81				10.56
French	15	J	12.40				9.60
French	18	J					9.00
Spanish	22	K					7.27
Spanish	29	K	13.07				7.69
Spanish	25	L				12.56	9.28
Spanish	24	L	13.00				11.16
Spanish	21	L					12.90
Spanish	30	L			13.07	14.30	12.90
Spanish	16	M	15.94				13.75
Spanish	13	M					14.31
Spanish	22	M				10.14	9.27
Spanish	60	N					12.20
Spanish	21	N	12.10	11.90			
Spanish	33	N	14.51				12.90

Table 18

Mean Textbook Attitude Scores of Junior High Students Administered Varying Numbers of Scales

Language	N	Teacher	Administration				
			1st	2nd	3rd	4th	5th
French	16	A	8.83				8.62
French	55	A					9.45
French	20	A	9.35				9.15
Spanish	34	B					9.09
Spanish	31	B	10.55				8.13
Spanish	26	C					5.46
Spanish	22	C	7.82				7.27
French	26	D	11.50				10.50
French	25	D				9.72	9.04
French	27	D	10.74				6.78
French	50	D					7.92
French	17	E	9.29				6.59
Spanish	34	E	8.76				6.18
Spanish	60	E					8.55
Spanish	22	E				9.09	9.09
Spanish	50	F					7.48
Spanish	25	F	12.04				11.04
Spanish	19	F	14.79				8.84
French	14	G	7.36	7.79			
French	6	G					8.83
French	33	H					8.09
French	43	H	7.08				8.88
Spanish	46	I					6.90
Spanish	31	I	9.52				9.39
French	16	J	7.31				8.31
French	15	J	8.87				8.27
French	18	J					7.56
Spanish	22	K					7.04
Spanish	29	K	8.07				8.59
Spanish	25	L				7.88	6.48
Spanish	24	L	8.12				7.42
Spanish	21	L					7.62
Spanish	30	L			8.23	9.00	10.37
Spanish	16	M	9.81				10.88
Spanish	13	M					11.46
Spanish	22	M				8.82	9.14
Spanish	60	N					8.60
Spanish	21	N	8.10	7.90			
Spanish	33	N	9.70				7.70

Table 19

Mean Total Attitude Scores of Junior High Students Administered Varying Numbers of Scales

Language	N	Teacher	Administration 1st	2nd	3rd	4th	5th
French	16	A	60.33				56.33
French	55	A					54.67
French	20	A	71.45				68.45
Spanish	34	B					70.11
Spanish	31	B	72.56				65.56
Spanish	26	C					38.58
Spanish	22	C	55.45				40.09
French	26	D	78.35				76.50
French	25	D				71.84	68.72
French	27	D	65.99				56.17
French	50	D					61.40
French	17	E	77.17				69.00
Spanish	34	E	82.14				61.94
Spanish	60	E					64.60
Spanish	22	E				64.50	65.77
Spanish	50	F					58.45
Spanish	25	F	65.48				58.96
Spanish	19	F	65.42				60.31
French	14	G	68.79	64.29			
French	6	G					64.23
French	33	H					55.04
French	43	H	52.98				53.41
Spanish	46	I					52.32
Spanish	31	I	58.68				55.19
French	16	J	49.38				42.94
French	15	J	67.47				49.40
French	18	J					39.44
Spanish	22	K					38.59
Spanish	29	K	63.38				48.93
Spanish	25	L				64.80	51.16
Spanish	24	L	66.32				62.66
Spanish	21	L					63.42
Spanish	30	L			67.39	70.79	66.09
Spanish	16	M	62.94				54.44
Spanish	13	M					59.00
Spanish	22	M				56.27	47.91
Spanish	60	N					51.10
Spanish	21	N	60.62	50.01			
Spanish	33	N	74.00				62.80

Each of the foregoing comparisons was based on a total of twenty-five tabulations. Since each teacher administered the scales in an irregular pattern to classes of different size and subject matter content, it is difficult to assess the precise probability of a purely chance distribution of mean differences. A gross assessment can be made, however, by assuming that the single final mean score should be higher than the final mean of the second (or third) administration in half the cases. From such an assumption it is obvious that the evidence in these tables neither supports nor refutes the pretest sensitization hypothesis. Of particular concern to the present study, however, is the fact that in four situations involving different instructional media and different subject matter, no evidence was found to indicate that changes in the attitudes investigated in this study are a function of the number of scales administered.

IV. RELATION OF ATTITUDE CHANGE TO PERSONAL CHARACTERISTICS OF THE LEARNER AND ENVIRONMENTAL FACTORS IN THE LEARNING SITUATION

To determine the extent to which the attitudes measured in this study were related to some of the personal characteristics of the learners as well as to selected environmental factors (other than instructional media), five situations were selected for investigation. The situations included 396 freshman English composition students at Colorado State University, 103 anthropology students taught by educational television at Colorado University, 130 general psychology students taught by educational television at the University of Missouri, 78 students of anatomy taught by a combination of lecture and programed instruction at Colorado State University, and 323 students of educational psychology taught in two large and five small classes at the University of Missouri. This phase of the overall study was undertaken for the following purposes: 1) to test specific hypotheses suggested by other research but not evaluated previously with respect to attitude change; 2) to identify areas for further research; and 3) to determine the appropriateness of "pooling" individual curves of attitude change to compute equations representing changes in attitudes involving different instructional media.

In the first situation (large lecture class in English composition), both personal and environmental factors were investigated. In the second and third situations, (anthropology and general psychology taught by educational television), only environmental factors were explored. In the fourth situation (combination lecture and programed instruction), the relationship between change in attitude and change in performance was investigated. In the fifth situation (large and small classes in educational psychology), class size was explored.

Situation One - Large English Class

The subjects in Situation One were freshman students who were enrolled in two sections of English composition in the fall quarter of 1963-64 at Colorado State University. The two classes were comprised of 240 students each. Students were administered the scales five times throughout the quarter (at two-week intervals). Because only those subjects for whom complete data were available were included in the analysis, the total was reduced to 394, 196 from one class and 198 from the other.

The personal and situational factors studied in Situation One included: aptitude, performance, achievement, sex, time of class, and seating arrangement. The index of aptitude involved in the analysis was the Scholastic Aptitude Test of the College Entrance Examination Board Verbal score. This test has been administered to the students as part of a preregistration test battery. In contrasting the changes in attitude of high and low aptitude students, approximately the upper and lower quarters of the distribution of SAT-V scores were used as the criterion. Both upper and lower groups consisted of 100 students.

The marks the students received at the end of the course represented the criterion measure of performance in the course. Both classes were treated as a single group with respect to performance, since the instructor was the same for each class. There were 6 A's, 52 B's, 250 C's, 33 D's, and 49 F's assigned. For purposes of comparison, A's and B's were combined into one group, while D's and F's comprised the other group, thus forming three performance groups.

The degree of over- or under-achievement of each student was assessed by using the SAT-V score and the grade obtained at the end of the course. In computing over- or under-achievement, the SAT-V scores were first arranged and then five subgroups identified whose persentages paralleled those of the course mark distribution. Weights of 4 through 0 were then assigned to both distributions so that each student received a numerical index of aptitude and of performance expressed in the same units. The algebraic difference between performance and aptitude was then computed. All students with a difference of +2 or greater were classified as over-achievers and those with -2 or greater were classed as under-achievers. There were 37 over-achievers and 32 under-achievers in the two classes combined.

The classes met twice each week for large class lectures and once additionally every other week for small discussions. Both lectures were held on Tuesday and Thursday, but one was at eleven o'clock and the other at two o'clock. For time comparison, the two classes were labeled "morning" and "afternoon."

Since both of the classes contained 240 students, an auditorium was used for the lectures. Seats were arranged in different levels descending toward the front of the room. Students were assigned seats in alphabetical order, front to back. For comparisons, the one third who sat in those seats in the front of the room were considered front, the next third middle, and the other third back. To contrast the attitudes of those students seated at the instructor's right versus his left, student groups were formed by selecting those sitting in the four right-hand most seats and those sitting in the four left-hand most seats in each row. This procedure yielded two groups of 92 students each.

To assess the relationship of attitude change to the personal characteristics and environmental factors included in this phase of the study, the analysis of variance was applied to the subgroup scores by area and by administration. Whenever only two subgroups were involved, t was obtained by abstracting the square root of F. The results of the application of the tests of significance are shown in Tables 20 through 23.

In general, with higher aptitude students reflected less favorable scores throughout the course than students of lower aptitude. Although only one difference was significant (Expectation, first administration, Table 21) the differences between the two aptitude groups were consistent throughout all administrations and all areas. The scores for Method and Total obtained by the lower aptitude group increased in favorability at the fifth scale administration, whereas the higher aptitude group reflected a gradual decrease.

Inspection of Tables 20 through 23 with respect to course marks indicated that the AB, C, and DF groups differed very little at the first administration. These differences increased, however, as the learning progressed. Trends were for the AB group to show the most favorable attitude, the DF group the least favorable, and the C group to maintain an intermediate position. In all three groups there was a pronounced drop of attitude between the first and second administrations, but in contrast to the continuous drop of the DF group, the AB group showed less and less decrease, with an increase in favorability at the fifth administration. Among the areas of the scale, the Content score reflected the greatest difference for the three groups.

Table 20

Mean Method Area Scores for English Subgroups by Administration

Subgroups	N	Administrations 1st	 2nd	 3rd	 4th	 5th
High-Aptitude	100	31.91	28.68	27.98	27.63	27.46
Low-Aptitude	100	33.04	30.68	29.11	28.43	29.07
5		.996	1.671	.930	.647	1.177
AB Group	58	33.00	30.48	29.34	28.86	29.36
C Group	250	32.70	30.14	28.82	28.61	28.55
DF Group	82	33.24	29.48	27.80	25.96	26.12
F		.235	.346	.706	3.155*	2.800
Over-Achievers	37	33.67	30.81	27.86	28.05	29.16
Under-Achievers	32	31.40	29.68	25.87	23.59	23.84
t		1.180	.685	1.037	2.167*	2.254*
Male	176	31.63	28.88	27.46	27.23	27.36
Female	218	33.60	30.97	29.56	28.69	28.71
t		2.334*	1.154	2.402*	1.640	1.443
Morning	198	32.40	29.99	29.26	28.43	28.40
Afternoon	196	33.04	30.08	27.97	27.64	27.81
t		.666	.194	1.422	.829	.713
Front	108	33.57	31.04	29.85	29.62	28.95
Middle	143	32.94	30.05	27.91	27.18	27.41
Back	143	31.86	29.25	28.41	27.69	28.17
F		2.882	1.473	1.625	2.592	.906
Right	92	32.58	29.19	27.97	27.68	27.23
Left	92	32.47	29.72	28.30	28.22	29.07
t		.476	.575	.476	1.094	1.420

* Significant at .05 level.
**Significant at .01 level.

Table 21

Mean Expectation Area Scores for English Subgroups by Administration

Subgroups	N	1st	2nd	3rd	4th	5th
High-Aptitude	100	9.82	8.75	8.29	7.96	8.28
Low-Aptitude	100	11.08	9.68	9.07	8.61	9.20
t		2.684**	1.379	1.519	1.199	1.565
AB Group	58	10.58	9.36	8.60	8.81	9.36
C Group	250	10.63	9.39	8.92	8.57	9.07
DF Group	82	10.65	8.82	8.59	7.76	7.91
F		.083	.833	.333	2.083	2.941
Over-Achievers	37	11.48	9.78	8.81	8.67	9.45
Under-Achievers	32	9.78	8.28	7.46	6.56	6.28
t		1.980	1.826	1.544	2.265*	3.103**
Male	176	10.32	8.85	8.39	8.35	8.61
Female	218	10.83	9.64	9.11	8.57	9.06
t		1.414	2.165*	1.907	1.788	1.084
Morning	198	10.51	9.50	9.08	8.81	8.97
Afternoon	196	10.69	9.07	8.51	8.12	8.75
t		.410	.724	1.462	1.759	.588
Front	108	10.80	9.84	9.19	8.58	8.77
Middle	143	10.88	9.18	8.31	8.39	8.59
Back	143	10.18	8.97	8.97	8.46	9.20
F		3.559*	1.876	1.077	.096	.809
Right	92	10.68	8.96	8.69	8.14	8.64
Left	92	10.39	9.23	8.14	8.25	9.05
t		.664	.608	1.065	.373	.740

* Significant at .05 level.
**Significant at .01 level.

Table 22

Mean Content Area Scores for English Subgroups by Administration

Subgroup	N	Administration 1st	2nd	3rd	4th	5th
High-Aptitude	100	12.40	11.08	10.79	10.85	10.61
Low-Aptitude	100	12.02	11.73	11.14	10.80	10.72
t		.947	1.498	.836	.000	.303
AB Group	58	13.18	11.79	11.62	11.36	11.46
C Group	250	12.16	11.50	10.92	10.90	10.70
DF Group	82	12.10	11.28	10.57	9.98	9.92
F		2.153	.857	1.266	4.750**	4.150*
Over-Achievers	37	12.62	12.08	11.16	11.37	11.21
Under-Achievers	32	11.40	10.90	9.62	9.03	8.96
t		1.667	1.732	2.420*	3.680**	3.219**
Male	176	11.64	10.85	10.30	10.32	10.06
Female	218	12.78	12.03	11.48	11.96	11.12
t		3.983**	3.858**	3.887**	2.516*	3.316**
Morning	198	12.44	11.83	11.50	11.13	10.89
Afternoon	196	12.10	11.16	10.40	10.37	10.40
t		1.090	2.249*	3.626**	2.444*	.484
Front	108	12.29	11.45	11.37	11.14	10.92
Middle	143	12.33	11.83	10.79	10.67	10.54
Back	143	12.19	11.20	10.79	10.53	10.55
F		.356	1.706	1.538	1.344	.582
Right	92	12.18	11.09	10.64	10.61	10.38
Left	92	12.31	11.25	10.94	11.06	11.04
t		.542	.564	.770	1.141	1.395

* Significant at .05 level.
**Significant at .01 level.

Table 23

Mean Total Area Scores for English Subgroups by Administration

Subgroups	N	Administration 1st	2nd	3rd	4th	5th
High-Aptitude	100	54.23	48.61	47.06	46.43	46.35
Low-Aptitude	100	56.14	52.09	49.40	47.85	48.99
t		1.087	1.829	1.208	.720	1.200
AB Group	58	56.77	51.63	49.56	49.03	50.18
C Group	250	55.50	51.04	48.67	48.10	48.33
DF Group	92	56.01	49.59	46.97	43.71	43.96
F		.400	.541	.880	3.771*	3.651*
Over-Achievers	37	57.78	52.67	47.83	48.10	49.83
Under-Achievers	32	51.65	48.87	42.96	39.53	39.09
t		3.032	1.367	1.661	2.584*	2.830**
Male	176	53.60	48.58	46.15	45.91	46.04
Female	218	57.40	52.70	50.21	48.39	48.94
t		3.003**	3.047**	2.888**	1.545	1.897
Morning	198	55.51	51.40	49.84	48.64	48.27
Afternoon	196	55.89	50.31	46.94	45.91	47.02
t		.240	.703	2.007*	1.883	.754
Front	108	56.67	52.34	50.42	49.35	48.65
Middle	143	56.16	51.08	47.02	46.25	46.55
Back	143	54.23	49.44	48.18	46.70	47.93
F		2.708	1.489	1.824	1.669	.669
Right	92	55.45	49.26	47.31	46.44	46.26
Left	92	55.18	50.21	47.39	47.54	49.17
t		.629	.628	.425	.668	1.374

* Significant at .05 level.
**Significant at .01 level.

Differences in attitudes between the over- and under-achievers as defined for this phase of the study became increasingly pronounced throughout the term. In all administrations in all areas the over-achievers reflected the more favorable attitudes although the differences were not significant prior to the third administration. Greatest differences between the over- and under-achievers were found in the area of Expectation Fulfillment. Of the 37 over-achievers, 25 were females and 12 were males, whereas the under-achieving group consisted of 19 males and 13 females.

It was hypothesized that female students would reflect more favorable attitude toward Content scores than male students. This hypothesis was supported throughout the five administrations as is shown in Table 22. Although female students tended to reflect higher scale scores than males throughout the other two areas, the differences were not significant. In general, differences in attitudes toward Method and Expectation between the two sexes became less marked in the latter two administrations.

The three foregoing analyses suggest that the characteristics of aptitude, performance, and sex are intercorrelated with attitude in a large lecture situation. Students with high aptitude tend to be more unfavorable than students with lower aptitude. High achieving students tend to be more favorable than low achieving students. Students who receive course marks higher than would be anticipated on the basis of their aptitude also reflect favorable attitudes. More female than male students comprise the over-achieving group.

No discernible pattern of attitude change was noted between the morning and afternoon groups. Likewise, no pattern of significance was found when the three groups representing front, middle, and back seats, or the two groups representing seats to the right or to the left of the instructor were contrasted.

Evidence within Situation One suggests that the attitudes investigated in this study are more closely related to personal characteristics of the learners than to environmental factors in the learning situation.

Situation Two - Anthropology, ETV

At the University of Colorado students were taught anthropology by direct television instruction. Live telecasts were received in two rooms, one a large lecture-type auditorium and the other a regular multipurpose classroom. The auditorium contained about one hundred twenty-five seats and the classroom about fifty seats. Graduate teaching assistants monitored each room. Students were administered the scales in counterbalanced order at intervals of three weeks during the one semester course. Complete data from the five administrations were available for 34 students in the small room and 69 students in the large room. Mean scores for the two groups by administration and area are shown in Table 24, along with the significance of the difference between the groups.

As can be seen from inspection of Table 24, no discernible pattern exists between the groups with respect to room size. This absence of pattern pertained to all areas and for all administrations. Thus, data from Situation Two suggest that the physical factor, room size per se is unrelated to the attitudes of learners measured in this study.

Situation Three - General Psychology, ETV

In the preceding section entitled "Attitude Change as a Function of the Number of Scales Administered," the instructional television program at the University of Missouri was described. One facet of this program was selected for this phase of the study--a comparison of attitude change

Table 24

Mean Attitude Scale Scores by Room Size
and Administration - Direct Television Teaching - Anthropology
N Small = 34, N Large = 69

		Administration				
Area	Room Size	1st	2nd	3rd	4th	5th
Method	Small	38.5	37.7	36.2	37.2	36.5
	Large	39.9	38.0	37.2	37.3	36.3
	t	.91	.25	.70	.11	.20
Expectation	Small	13.4	12.7	12.4	12.1	11.9
	Large	13.6	12.8	12.4	12.5	11.6
	t	.11	.07	.00	.21	.15
Content	Small	15.6	14.8	14.3	14.8	13.9
	Large	16.6	15.6	14.7	14.4	13.6
	t	1.21	.98	.41	.52	.40
Total	Small	68.3	65.9	63.5	64.9	62.5
	Large	69.3	66.4	64.2	64.2	61.8
	t	.61	.42	.54	.55	.57

involving rooms of different age and physical condition.

One room in which telecasts were received at the University of Missouri was on the top floor of one of the older buildings on the campus. This room was of the auditorium type with tiers of fixed chairs with arms descending to a lecture platform. Although this room was comfortable from the standpoint of temperature and ventilation, it was not as pleasant as several rooms in a new classroom building in which the other sections met for instruction. The new rooms were of multipurpose type with movable chairs and excellent natural lighting. Complete data were available for 34 students receiving the telecasts in the "old" room and 96 students receiving the general psychology telecasts in three "new" rooms.

Mean scores by area, age of room, and administration are found in Table 25. Inspection of this table reveals no pattern of scores related to age of room. This situation, like Situations One and Two, yielded little or no evidence that the attitudes toward learning measured in this study are related to physical factors in the learning situation.

Situation Four - Anatomy, Lecture and Programed Laboratory

In the College of Veterinary Medicine at Colorado State University the basic course in anatomy required of all veterinary medicine students was taught by a combination lecture and programed laboratory procedure. Students met daily as a total group of 80 for both lecture and laboratory experiences. Both lecture and laboratory were supervised by the same instructor who prepared all materials. In addition to the programed laboratory manual, parts of the lectures were also programed, the frames being projected on a large screen at the front of the room. In a sense,

Table 25

Mean Attitude Scale Scores by
Area, Age of Room and Administration - General Psychology
N, Old Room = 34   N, New Room = 96

		Administration				
Area	Age of Room	1st	2nd	3rd	4th	5th
Method	Old	33.1	33.0	30.8	30.5	30.9
	New	33.8	31.9	31.6	30.4	31.0
	t	.69	.94	.71	.11	.09
Expectation	Old	10.8	9.9	10.1	9.6	9.2
	New	11.1	10.7	10.2	9.3	9.3
	t	.29	.74	.11	.15	.09
Content	Old	13.8	12.8	12.7	11.9	11.9
	New	12.9	12.2	12.1	11.8	12.2
	t	.86	.73	.69	.12	.24
Total	Old	57.7	55.6	53.6	52.0	52.0
	New	57.8	54.8	53.8	51.5	52.5
	t	.05	.44	.31	.46	.41

the lectures were partially teacher-paced programed instruction. The students responded to the scales in counterbalanced order at intervals of two weeks throughout the ten week quarter.

Changes in attitude within this group as a whole are discussed in the last section of this report. Of particular concern here was the relationship between grades received during the course and attitudes of students measured at the time the grades were assigned. This situation was particularly well adapted to the investigation of this relationship, since the students were administered quizzes and examinations on a weekly basis. The students were told their grades each week and were encouraged to compute a continuous average throughout the term. The final grade given by the instructor was based on a composite of the weekly quizzes and the examination marks.

At the end of the course students were classified into four groups according to the relation between their final grade and their weekly marks as follows:

Constant - Final grade deviating no more than one unit from the weekly average throughout the term, N = 37.

Low to High - Final grade at least one unit higher than the average for the first three weeks, N = 19 (Unit here means one grade category, A, B, C, D or F).

Up Down Up - Weekly average of the first and last three weeks at least one unit higher than the middle three weeks, N = 10.

High to Low - Final Grade at least one unit lower than the average of the marks for the first three weeks, N = 12.

Mean scores for the four groups of students by area and by administration are shown in Table 26. This phase of the investigation was

Table 26

Mean Attitude Scale Scores by Change in
Grades and Administration - Anatomy
N=78

Area	Group	N	Administration				
			1st	2nd	3rd	4th	5th
Method	Constant	37	44.6	44.3	43.9	41.0	39.4
	Low to high	19	45.6	43.2	41.8	41.1	38.6
	Up down up	10	47.4	45.4	41.8	40.1	38.5
	High to low	12	42.9	42.8	40.3	39.7	34.3
Expectation	Constant	37	13.7	13.3	14.1	12.6	12.2
	Low to high	19	14.2	14.1	13.3	13.0	11.8
	Up down up	10	14.9	14.5	13.5	12.0	10.2
	High to low	12	13.9	13.8	13.6	12.8	11.8
Content	Constant	37	16.1	14.8	14.9	14.4	13.7
	Low to high	19	15.9	15.6	15.0	14.3	13.6
	Up down up	10	16.2	16.1	14.2	13.6	13.7
	High to low	12	15.8	15.8	13.8	13.8	12.9
Total	Constant	37	74.6	72.4	72.7	67.4	65.2
	Low to high	19	75.6	72.8	70.1	68.6	64.1
	Up down up	10	78.5	76.0	69.5	65.7	63.4
	High to low	12	72.7	72.3	67.6	66.8	59.1

considered exploratory, consequently no tests of significance were computed for the data in Table 26. From a discriptive standpoint only, however, several hypotheses to be tested in future studies are suggested.

From inspection of Table 26 it can be seen that those students whose weekly quiz marks varied least throughout the term also reflected the least variable attitudes (Constant group). Conversely, those students whose weekly quiz grades fluctuated to the greatest degree also reflected the most variable attitudes (Up Down Up). The High to Low group tended to have the sharpest drop in attitudes in the last portion of the course. All these observations support the following hypothesis: Even under stimulating learning conditions, there is a continual interaction between attitudes and achievement, this becoming more pronounced as the learning progresses. Additional study of the interaction of attitude grades and aptitude throughout a course is needed before conclusions in this area are reached. Suffice it to say, however, the point in the learning experience at which the assessments of attitude are made, is an important variable.

Situation Five - Educational Psychology, Large and Small Classes

At the University of Missouri educational psychology was taught in both large lecture classes and in small discussion sections. Of the nine sections of this course, two large and seven small, all but two sections were available for the present study. Although different instructors were involved in the actual teaching, close coordination existed among the sections and several examinations were identical. All sections were taught by experienced instructors. The classes met twice each week for approximately one and one half hours per session. Data from five administrations of the forms of the scale in counterbalanced order were available for 172 students (two sections) taught in large classes and 152 students (five sections) taught in smaller classes. The scales were administered at three-week intervals throughout the fifteen week course.

Mean attitude scale scores by area, class and administration are shown in Table 27, together with the t-values resulting from contrasting the various means.

As can be seen from inspection of Table 27, of the 20 t-values computed, only three reached significance, and one of these (Total score, 2nd administration) is a function of the area difference in the subscale score for Expectation Fulfillment. No patter of differences is discernible.

Strictly speaking, comparisons of attitudes of groups of students in Situation Five must be considered as very gross, since different instructors were involved in the various sections. The striking similarity for the results of the two groups suggests that 1) the instructional experience was closely coordinated among the seven sections, and 2) the students responded quite accurately to the attitude dimensions defined in the attitude scale developed for this investiagtion.

Summary

From the five situations studied in this phase of the investigation, extensive evidence was found to indicate that attitudes toward Method, Expectation and Content are related to the personal characteristics of the learner. Conversely, no evidence was found to indicate a relationship of consequence between environmental factors in the learning situation and attitude change. This suggests the necessity of accounting

Table 27

Significance of the Differences between Large and Small Class Mean Attitude Scores
by Area and Administration
N=324

Area	Class	N	Administration									
			1	t	2	t	3	t	4	t	5	t
Method	Large	172	31.25	0.143	31.76	1.794	29.95	0.592	30.26	1.565	29.40	0.281
	Small	152	31.10		30.04		30.49		29.80		29.13	
Expectation	Large	172	8.80	2.274*	9.07	2.891**	8.35	1.694	8.42	1.863	7.71	1.145
	Small	152	7.63		7.71		7.60		7.54		7.17	
Content	Large	172	10.86	1.300	10.59	0.995	10.44	0.152	10.46	0.927	9.91	0.152
	Small	152	10.31		10.17		10.50		10.10		9.97	
Total	Large	172	50.92	1.058	51.42	2.124*	48.74	0.324	49.14	1.072	47.02	1.456
	Small	152	49.07		47.91		48.59		47.39		46.27	

**Significant at the .01 level.
* Significant at the .05 level.

for individual differences in curves of attitude change to the fullest extent possible if meaningful comparisons of different media are to be made. The implications of this conclusion will be discussed in detail in the final section of this report.

V. CHANGES IN ATTITUDES OF LEARNERS WHEN PROGRAMED INSTRUCTION IS INTERPOLATED BETWEEN TWO CONVENTIONAL INSTRUCTION EXPERIENCES

Although most of the hypotheses tested in the present research project involved comparison of changes in attitude within formal learning experiences involving continuous exposure to one or more instructional media, one phase of the research was devoted to assessing the impact on attitudes when a "new media" situation is interpolated between conventional experiences within one course. Two such courses were identified in which programed instructional units were interpolated between conventional lecture approaches. These two courses were taught at Lowry Air Force Base, Denver, Colorado. This section of the report describes the assessment procedures and results in these courses.

Background

The research literature contains a substantial amount of evidence demonstrating the effectiveness of programed instruction for achieving various types of objectives in many subject matter areas (Hughes & McNamara, 1961), (Morrill, 1961), (Silverman, 1960). Considerable evidence is also available indicating that, in general, student reaction to programed instruction is favorable (Feldhusen, 1961), (Holland & Skinner, 1961), (Klaus & Deterline, 1962). Relatively few studies have been conducted, however, in which differential student reactions to programed instruction and conventional instruction have been assessed. It was the purpose of the study reported here to determine the nature of changes in student attitudes when programed instruction is interpolated between conventional instruction experiences.

Overview of Design

Five parallel forms of a twenty-six-item attitude scale measuring attitude toward method of instruction, expectation fulfillment and course content were administered in counterbalanced order to 123 airmen enrolled in two combination lecture and programed instruction courses. The two courses, Radiation Detection and Camera Repair, were arranged such that students experienced several weeks of conventional instruction, then a programed unit, then conventional instruction for the remainder of the course.

Radiation Detection and Camera Repair Programs

The programs involved in the two courses were linear programs prepared by Air Force Personnel. The Radiation Detection program consisted of seven units and six hundred frames and the Camera Repair program consisted of eight units and nine hundred frames. Time required to complete each of the programs varied from eight to twenty hours. The airmen in both courses completed the programs according to their own rate. When the airmen finished the program, they were free to read in a technical library or review material covered previously.

Administration Procedure and Subjects

The airmen who participated in this study included all those enrolled in both courses from October, 1963, to March, 1964, and all those enrolled in the Camera Repair course from April to June, 1964. New classes started the fifteen-week courses on a bi-weekly basis. Class enrollments ranged from five to twelve with a median class size of six. Because of changes in schedule and incomplete data, airmen in six classes were not included in the final analyses.

Scales used in the first, second and fifth administrations were administered to the classes in group situations. Since scales used in the third and fourth administrations were to be completed halfway through and at the end of the self paced programs, the airmen were given addressed, stamped envelopes and were asked to complete the scales at the specified points. Each airman was responsible for mailing his own completed scales to Colorado State University.

At the time of the first administration, a brief description of the proposed procedure was read to the group by one of the authors. The airmen were told only that the study was one of a series of projects designed to assess changes in attitude during learning situations. No reference was made to contrasting instructional techniques. Enrollees were assured that participation in the project was voluntary and that their individual responses would not be revealed. Throughout the project, cooperation was excellent and none of the airmen refused to participate.

The airmen had been chosen for those courses according to military needs, test scores, and interest in the subject matter. Almost all were high school graduates and about twenty per cent had attended college, although relatively few had received degrees.

Results

Coefficients of correlation computed between adjacent administrations for both courses are shown in Table 28. From inspection of the coefficients in Table 28, it is apparent that there was greater correlation between adjacent administrations within the same instructional condition than between conditions. The coefficients within instructional conditions, which ranged from .31 to .84 were reported in Section II as estimates of reliability.

Table 28

Coefficients of Correlation between Adjacent Administrations - Radiation Detection and Camera Repair

Area		N	Administration 1 & 2	2 & 3	3 & 4	4 & 5
Method	Radiation Detection	70	.31	-.01	.81	-.06
	Camera Repair	53	.67	.27	.48	-.06
Expectation	Radiation Detection	70	.46	.09	.78	.08
	Camera Repair	53	.62	.40	.59	.26
Content	Radiation Detection	70	.41	.27	.81	.35
	Camera Repair	53	.63	.52	.56	.28
Total	Radiation Detection	70	.72	-.05	.84	.04
	Camera Repair	53	.71	.37	.56	.04

Table 29

Mean Attitude Scores by Area and by Administration Radiation Detection and Camera Repair

Area	Class	N	Administration 1	2	3	4	5	F
Method	Radiation Detection	70	40.6	41.3	43.3	44.7	39.9	4.52**
	Camera Repair	53	40.4	37.7	39.0	41.6	36.4	3.31*
Expectation	Radiation Detection	70	13.7	12.7	14.0	14.3	12.6	8.50**
	Camera Repair	53	13.2	13.0	13.2	13.3	12.2	1.14
Content	Radiation Detection	70	14.7	14.7	15.2	15.3	14.1	3.62**
	Camera Repair	53	14.1	13.1	13.2	13.6	12.6	2.37
Total	Radiation Detection	70	69.1	68.8	72.6	74.3	66.6	4.08**
	Camera Repair	53	67.8	63.8	65.4	68.2	61.2	3.11*

* Between administrations F significant at the .05 level.
**Between administrations F significant at the .01 level.

Although the estimates are not high, they can be considered satisfactory for group comparisons.

In Table 29 are shown the mean attitude scale scores tabulated by administration and area for both courses. To determine the significance of the differences among the five means within each area, the analysis of variance was applied to the data. Since these data are repeated administrations of attitude scales to the same subjects, the source of variation attributable to "individuals" was isolated and tested separately. In all instances, this source of variation was found to be significant, indicating that correlation existed among the scores obtained for the individual students. The significance of the "between administrations" source of variation is shown in the column of F-values in Table 29. Significant changes in attitude scores resulted in all but two areas and these were both in the Camera Repair course.

Inspection of the means in Table 29 reveals that a similar pattern for both area and total scores resulted from the repeated administration of the scales although the Camera Repair means generally were lower than those for Radiation Detection. Except for the first administration Camera Repair content mean score, the most favorable attitude in all other instances was reflected at the end of the programed unit (fourth administration) In every instance the lowest mean occurred two weeks after returning to conventional instruction (fifth administration).

Within the programed unit (third and fourth administrations), the fourth administration mean was higher than that for the third administration. This suggests that any Hawthorne or novelty effect was either still operating at the end of the unit or did not occur in this situation.

To determine the statistical significance of changes in attitude during various parts of the courses, the significance of the differences between adjacent means was computed and is shown in Table 30. Inspection of this table indicates that a significant decrease in favorability of attitudes occurred for each area and the total scale in both courses between the fourth and fifth administrations. It can also be noted that in the Radiation Detection course, a significant increase in favorability of attitudes occurred between the second and third administrations in all areas and the total score.

Table 30

Significance of Differences between
Adjacent Administrations for Radiation Detection
and Camera Repair Courses

		Administrations			
Area	Course	1 & 2	2 & 3	3 & 4	4 & 5
Method	Rad Det (N=70)		.05 level		.01 level
	Cam Rep (N=53)	.05 level		.05 level	.01 level
Expectation	Rad Det	.01 level	.01 level		.01 level
	Cam Rep				.05 level
Content	Rad Det		.05 level		.01 level
	Cam Rep	.01 level			.01 level
Total	Rad Det		.01 level		.01 level
	Cam Rep	.05 level			.01 level

Discussion

The results of this phase of the study clearly indicate that pronounced changes in student attitudes are associated with programed instruction interpolated between conventional instruction experiences. Students reflected more favorable attitudes toward method and course content and experienced greater expectation fulfillment. Several possible explanations of these findings warrant exploration. Among them are the following:

Explanation Number One. The more appealing aspects of the subject matter were selected for the program content. The two programs for the courses involved in this study were prepared after a detailed analysis of course objectives and content. Those topics included in the program were selected which required a sequence of responses from the students but which were neither more difficult nor more interesting than other topics. In fact, the Camera Repair programed unit contained a sub unit on gyroscopes--material considered prerequisite to, but not an integral part of, the last portion of the course.

Some evidence reflecting the appeal of the subject matter of the programed units can be found in the attitude toward content mean scores shown in Table 30. To the extent that the content is inherently more appealing than the rest of the course, a marked increase in attitude toward content score should be found between administrations two and three. In the Camera Repair course, the content score difference between administrations two and three was not significant. In the Radiation Detection course, the difference was significant at the .05 level. The significance of this difference, however, was equalled by the significance of the parallel difference for method mean scores and was surpassed by the significance of the difference (.01) for expectation fulfillment mean scores. Thus, the available evidence does not support the explanation to content of the programed unit.

Explanation Number Two. Whereas the material prior to and during the programed unit was appealing to students, the content of the unit immediately following the program was unappealing. This explanation is obviously related to Number One and can be partially evaluated from the same source of evidence, Table 30, but from administrations four and five. Whereas attitude toward content mean scores did decline significantly (.01 level) between the fourth and fifth administrations for both courses, so also did the mean scores for method (both courses), for expectation (Radiation Detection), and for total (both courses). There is no clear-cut evidence against the appeal of the last portions of the courses. Although slightly more evidence in support of this explanation can be found than that which supports Explanation One, such evidence can hardly be considered substantial.

Explanation Number Three. *The fifth administration of the scales may reflect a decrease in mean scores typically found from repeated administrations of attitude scales to the same subjects.* Whereas it is true that frequent decreases in attitude scales scores result when such scales are administered more than once, it would be expected that the decrease would appear consistently within each experimental condition for each pair of adjacent administrations. Inspection of Table 30 reveals that this is not borne out, since the second mean obtained during the programed unit is larger in all cases than the first mean (third administration). It should be noted, however, that this explanation cannot be tested adequately from the design of this study. A design such as that presented in Section III or that proposed by Solomon (1949) in which part of the subjects do not respond to any scale until the end of the experimental period would be required for adequate evaluation of this explanation.

Explanation Number Four. *Fluctuation in attitude scores during the experimental period is primarily the result of responses made by some unique subgroup of students.* To evaluate this explanation requires detailed examination of the characteristics of students comprising the total sample. Data relating to the general mental ability and to previous achievement of the students in the Radiation Detection course were available for this type of analysis and were analyzed as follows: Students were ranked according to the Airman Qualifying Examination General Aptitude Index and the highest and the lowest 25% of the distribution were identified. These groups were labeled "high ability" and "low ability." The mean attitude scores for the six subgroups were computed by administration and by area and are shown in Table 31. The same procedure was repeated for measures of previous achievement, but the two groups (high and low 25%) were designated "high grades" and "low grades." To obtain a measure based upon both achievement and ability, the ability rank was subtracted algebraically from the achievement rank. From this distribution of differences, the "over achievers" (upper 25%) and the "under achievers" (lower 25%) were identified. Since the means in Table 31 were obtained from "mutilated" distributions and were computed for description only, no test of significance were made for the differences among them.

Detailed inspection of Table 31 indicates that differences between the subgroup means within administrations are pronounced for two characteristics--grades and ability. Both the high grade subgroup and the high ability subgroup reflected similar patterns except that the high grade subgroup showed slightly more favorable initial attitudes. As would be expected, the membership of these two subgroups overlapped. Twelve of the seventeen students were members of both groups. Nine of the members of the low ability-low grades subgroups were members of both subgroups. Since the over-under achievement subgroups consisted of both high and low ability students and high and low grade students in various combinations, their means within administrations tended to fall between those of the groups defined according to grades and ability.

Table 31

Mean Attitude Scores for Radiation Detection Subgroups by
Area and Administration
(N=17 for each subgroup)

Area	Subgroup	Administration				
		1	2	3	4	5
Method	Over Achievers	41.3	42.1	42.2	44.6	41.8
	Under Achievers	41.2	44.2	42.7	45.4	41.5
	High Ability	39.1	39.1	44.8	46.4	35.3
	Low Ability	38.0	41.1	41.5	42.7	40.8
	High Grades	42.3	38.3	45.5	46.4	36.4
	Low Grades	40.3	43.9	42.1	45.5	42.5
Expectation	Over Achievers	13.9	13.0	13.9	14.9	12.9
	Under Achievers	13.8	13.8	13.7	14.6	13.3
	High Ability	13.1	11.5	15.4	15.2	10.8
	Low Ability	14.0	12.8	14.1	14.1	13.1
	High Grades	12.9	10.5	14.4	14.7	10.7
	Low Grades	13.3	13.9	13.6	14.1	13.8
Content	Over Achievers	15.8	14.5	15.6	15.4	13.6
	Under Achievers	14.5	15.6	15.1	15.3	15.0
	High Ability	14.8	14.6	15.6	15.9	13.8
	Low Ability	13.9	14.8	14.7	14.8	13.7
	High Grades	15.4	13.7	15.9	15.8	13.0
	Low Grades	13.7	14.9	14.9	15.4	14.5
Total	Over Achievers	71.0	69.6	71.5	74.9	68.2
	Under Achievers	69.5	73.6	71.5	75.8	69.8
	High Ability	66.9	65.2	75.7	77.5	59.8
	Low Ability	65.0	68.8	70.3	71.6	67.6
	High Grades	70.6	62.5	75.8	76.9	60.1
	Low Grades	67.2	72.7	70.5	75.1	70.8

The major implications of this phase of the research project relate to the impact on the learner of the transition from one instructional method to another when more than one method is involved in a learning experience. This phase of the present study was not designed to evaluate procedures for effecting a smooth transition. It seems reasonable to postulate, however, that steps might be taken to avoid the pronounced decrease in favorability of attitudes which occurred in this investigation. Although further research will be necessary to assess the effectiveness of each of the following practices for contributing toward a smooth transition from programed instruction to conventional instruction, the following suggestions may offer promise.

1. Make the change gradual rather than abrupt. In the present study the students changed abruptly from one method to the other. It is conceivable that this procedure emphasized inherent differences between the two methods. It is suggested that the procedure of overlapping the two methods in varying degrees be evaluated.

2. Arrange to have a unit especially challenging to high ability students immediately following the programed instruction. Since the decrease in favorable attitudes was most pronounced for high ability and high achieving students, a special effort to provide satisfaction for these subgroups might be made through rearranging the content of a course. Although the influence on low ability students of such a procedure would need to be evaluated also, this procedure might contribute toward avoiding the severe decrease in overall group attitude.

3. Prepare students for the change by discussing the differences between methods to be utilized in the learning experience. It can be hypothesized that attitudes toward a learning experience are a function of the expectation of the individual. The greater the discrepancy between his expectation and

what he actually experiences, the less favorable will be his attitude. It should be possible for an instructor to assist students in establishing realistic expectations by discussing the strengths and limitations of each method of instruction used in a particular learning experience.

4. Emphasize those learning aspects during conventional instruction which students prefer in programed instruction. Frequently in new media investigations the conventional aspects of instruction are ignored. It is entirely possible in experimental learning situations that the conventional instruction suffers indirectly as a result of the new medium being evaluated. It is strongly suggested here that such aspects of learning as attention to individual differences, appropriate pacing, immediate evaluation of responses and constant attention to motivation be emphasized in conventional instruction methodology.

In summary, findings from this phase of the investigation support the following conclusions:

1. Programed instruction interpolated between conventional experiences is associated with pronounced changes in student attitudes.

2. Students tend to reflect more favorable attitudes during programed instruction than during conventional instruction.

3. Differential attitudes during programed and conventional instruction are especially critical for high ability students.

4. Special attention to student attitudes by the instructor is warranted during the transition from programed instruction to conventional instruction.

VI. STATISTICAL ANALYSIS OF ATTITUDE CHANGE IN SITUATIONS INVOLVING DIFFERENT INSTRUCTIONAL MEDIA

The central purpose of the present study was that of assessing changes in attitudes of learners in situations involving different instructional media. Much of the research effort discussed in previous sections of this report was undertaken to provide insight into the final phases of the project. Results from this phase are reported in this chapter. In the first section of the chapter, the general procedure for fitting linear and quadratic equations to longitudinal data is discussed. In the second section, the individual media situations and groups of situations described and the results from the analyses of attitude change are presented. The implications are discussed in the third section.

Analysis of Regression

Repeated measurements of a characteristic of an individual can readily be expressed as an equation in which the dependent variable is the repeated observation and the independent variable is the ordinal sequence of the measurement. Such repeated measurements can be grouped for any number of individuals having similar properties. If the most accurate characterization of the repeated measurements of an individual or a group is desired, however, the investigator must determine which of several equations will most accurately represent the data. The larger the number of repeated measurements, the greater the number of equations which can be explored for a meaningful characterization.

In the present investigation, five repeated measures of four or more aspects of attitude toward learning were obtained for 3,049

individuals in 72 learning situations. The 72 situations represented eleven groups of instructional media. The central problem in this portion of the analysis was that of identifying the appropriate equation for each attitude score in each media group and determining the extent to which this equation could account for individual differences among learners.

Scores and means for individuals and for various learning situations were first plotted to assess visually the general trends in attitude change. Ten situations representing different patterns of change were selected by inspection for preliminary analyses. For the data from these situations the following equations were computed:

$$\text{(linear)} \quad Y = BX + C$$

$$\text{(quadratic 1)} \quad Y = B_1X + B_2X^2 + C$$

$$\text{(quadratic 2)} \quad Y = B_1X + B_2X^2 + B_3X^3 + C$$

$$\text{(quadratic 3)} \quad Y = B_1X + B_2X^2 + B_3X^3 + B_4X^4 + C$$

where Y is the attitude score, X is the ordinal sequence of the measurement and C is a constant. Since X for each situation represented 1 through 5 inclusive, the sizes of the values and amount of computation involved were reduced by assigning -2 through +2 to the ordinal sequence.

By fitting all four equations to the data and systematically testing the significance of the contribution of each expression, it was determined that no significant contribution was made by expressing the ordinal sequence beyond X . In fact, it was noted that the equations for several of the situations were linear.

The foregoing analyses were made using an IBM 7090 computer. Because of the magnitude of the values involved in the solution of B_3 and B_4, it was necessary to reduce the sample size for each situation to less than 100.

Having determined the general nature of the equations to be used in the final phase of the study, an analysis of regression program was developed for the IBM 1620 computer which would permit the isolation of the attitude change variable and would also yield a test of significance of the linear and quadratic equations involved. Since data presented in Chapter IV indicated that several personal characteristics of the learners were related to attitude change, it was considered desirable to isolate as many sources of variation as possible in the final analysis of variance of regression. It was decided that this could be best accomplished by fitting the equations to each individual learner's data within each media group. By so doing, it was also possible to account for variations among the learning situations comprising each group.

Sources of variation identified in the analysis for each attitude measurement were as follows:

Total: Variation of the five sequential scores for each individual around the general mean of all scores for all individuals.

Cases: Variation of the mean of the five administrations for each individual around the mean of the means of the five administrations.

Linear plus Quadratic: Variation accounted for by the regression of ordinal sequence of administration on attitude score expressed as

$$Y = B_1X + B_2X + C$$

for the media group being investigated.

Linear: Variation accounted for by the linear equation

$$Y = BX + C$$

for the media group being investigated.

Quadratic: Variation accounted for by the quadratic equation above and beyond that accounted for by the linear equation. This source of variation can be thought of as the advantage of the quadratic equation over the linear equation. The fact that the ordinal sequences of administration were expressed as -2 to +2 rather than 1 to 5 permits the testing of the advantage of the quadratic over the linear equation simultaneously with the computation of the regression coefficients.

Regression Deviation: Variation of the regression equation for each individual case around the general regression equation for the media groups. This source of variation is devisible into variation of the individual linear equations around the general linear equation and variation of the "quadratic only" around the generalized quadratic portion of the equation.

Residual: Variation in scores unaccounted for through the foregoing sources.

The three sources of variation crucial to the present study include Linear plus Quadratic, and the two subdivisions of this source, Linear and Quadratic computed separately. F-tests associated with these sources of variation indicate the extent to which a significant portion of the total variation has been identified and the nature of the changes in attitude associated with the media grouping concerned.

Results Within Various Media Groups

The individual learning situations in this project were so chosen as to represent a variety of instructional settings. The situations did lend themselves to grouping, however, according to the method of instruction involved. Such grouping resulted in eleven general media groups, each containing from one to twenty-one individual situations. The eleven groups included programed instruction, educational television, combination lecture and programed laboratory, small size lecture-discussion classes, large lecture classes, foreign language classes with standard language laboratory experiences, and foreign language classes with emphasis on film, tapes, and recordings.

Group One Situations - Programed Instruction

Six individual learning situations, all involving programed instruction as the primary method of instruction, comprised Group One situations. In the first two situations, beginning German at Colorado State University, one group of students studied from a linear program entirely at their own pace for a twelve-week period while a second group met regularly with a teacher and utilized the same program in a class situation. In the self-paced group, each student used a tape recorder correlated with a programed text for the course. In the other group, the teacher projected the individual frames from the text on a large screen in the classroom and the students repeated statements and answered questions in German after stimulus statements and questions had been amplified by a tape recorder.

In two additional situations, programed audio visual instruction at Colorado University, students learned to operate six pieces of audio-visual equipment using a programed text and working at their own rate. Since students in this course were teacher trainees engaged in student teaching for one half of the semester involved, the course was offered during the other half of the semester. Students met for lecture and discussion at the start of the course, but checked out the equipment and completed the program at their own convenience. Data were replicated for two seven-week courses within one semester.

In a programed English course at Colorado State University, composition and spelling were studied from a linear programed text at the students' own pace. The class met briefly as a group for announcements or examinations each week, but proceeded through the programed text entirely at their own pace. Data were replicated for three consecutive quarters.

In the final programed instruction situation in Group One, fifteen employees of the State Farm Insurance Companies completed a 450-frame program on written communications and letter writing. The employees met as a group once a week and covered one unit of the course at each session. When an employee had completed the week's unit, he was free to leave the classroom. The course covered nine weeks and the program consisted of approximately 450 frames.

Group One Results

Means and standard deviations for the five administrations in Group One situations are shown in Table 32. Inspection of this table reveals that attitudes became less favorable through the first three administrations but held nearly constant or improved at the fourth administration and then declined slightly at the last administration.

Table 32

Means and Standard Deviations for Five Administrations in Group One Situations - Programed Instruction N=257

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	44.1	43.7	42.5	42.3	42.1
	Std Dev	7.6	8.2	8.1	8.3	8.7
Expectation	Mean	14.5	14.4	13.9	13.9	13.6
	Std Dev	3.0	3.5	3.5	3.5	3.4
Content	Mean	14.9	14.5	13.9	14.1	13.9
	Std Dev	3.0	3.1	3.2	3.1	3.2
Total	Mean	73.7	72.2	69.4	69.7	68.4
	Std Dev	12.6	14.2	14.6	14.4	15.5

Programed Instruction	N
Self Paced German, CSU	16
Teacher Paced German, CSU	35
Audio Visual Program, CU	49
Programed English, CSU	117
Programed Letter Writing State Farm Insurance	15
Audio Visual Program, CU	25
	257

Variability tended to increase slightly across the five administrations.

Analyses of the regression data for Group One situations are shown in Tables 33 through 36. Particularly noteworthy in these tables is the relatively large amount of variation accounted for by the regression equations. There was a significant advantage of the quadratic equation over the linear equation for both Method and Expectation, but a linear relationship characterized the Content scores. This suggests that there may be a Hawthorne effect involved in using programed instruction, but that reaction to subject matter content remains relatively constant in this group of situations.

Group Two Situations - Educational Television

The educational television situations comprising Group Two were in two instructional settings, the University of Missouri and the University of Colorado. Detailed descriptions of the two courses involved at the University of Missouri, General Psychology and Agricultural Economics, were given in Chapter III, "Attitude Change as a Function of the Number of Scales Administered" (page 22).[1] A detailed description of the University of Colorado direct instructional television course, "Anthropology," was given in Chapter IV "Relation of Attitude Change to Personal Characteristics of the Learner and Environmental Factors in the Learning Situation" (page 48). Instructors in these three courses were experienced television teachers.

Group Two Results

Inspection of the Group Two means and standard deviations found in Table 37 reveals that there was a tendency for the attitude scores

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[1] One student in General Psychology at the University of Missouri was omitted from the pretest sensitization analysis, thus, the two N's are 164 and 165.

Table 33

Adjusted Linear, Quadratic Regression for Method in Group One - Programed Instruction

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1285	2467308.00		
Mean	1	2380180.86		
Cases	256	68003.53	265.63	22.45**
Lin + Quad Reg	2	1190.07	595.03	50.30**
Linear	1	1074.80	1074.80	90.86**
Quadratic	1	115.26	115.26	9.74**
Reg Dev	512	11853.47	23.15	1.95**
Linear	256	8585.59	33.53	2.83**
Quadratic	256	3267.87	12.76	1.07
Residual	514	6080.05	11.82	

Mean 43.0 Beta 1 -.6466 Beta 2 .1789

Table 34

Adjusted Linear, Quadratic Regression for Expectation in Group One - Programed Instruction

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1285	263389.00		
Mean	1	253458.52		
Cases	256	11212.47	43.79	17.26**
Lin + Quad Reg	2	147.78	73.89	29.13**
Linear	1	147.64	147.64	58.21**
Quadratic	1	.13	.13	.05
Reg Dev	512	2266.61	4.42	1.74**
Linear	256	1405.75	5.49	2.16**
Quadratic	256	860.86	3.36	1.32**
Residual	514	1303.59	2.53	

Mean 14.0 Beta 1 -.2396 Beta 2 .0061

Table 35

Adjusted Linear, Quadratic Regression for Content in Group One - Programed Instruction

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1285	274025.00		
Mean	1	261441.43		
Cases	256	9868.76	38.54	19.12**
Lin + Quad Reg	2	163.11	81.55	40.45**
Linear	1	141.01	141.01	69.94**
Quadratic	1	22.10	22.10	10.96**
Reg Dev	512	1515.45	2.95	1.46**
Linear	256	885.98	3.46	1.71**
Quadratic	256	629.46	2.45	1.21
Residual	514	1036.22	2.01	

Mean 14.2 Beta 1 -.2342 Beta 2 .0783

Table 36

Adjusted Linear, Quadratic Regression for Total in Group One - Programed Instruction

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1285	6769867.00		
Mean	1	6536035.81		
Cases	256	189041.98	738.44	29.28**
Lin + Quad Reg	2	3709.42	1854.71	73.54**
Linear	1	3363.26	3363.26	133.36**
Quadratic	1	346.15	346.15	13.72**
Reg Dev	512	28117.60	54.91	2.17**
Linear	256	19555.33	76.38	3.02**
Quadratic	256	8562.27	33.44	1.32**
Residual	514	12962.17	25.21	

Mean 71.3 Beta 1 -1.1439 Beta 2 .3101

Table 37

Means and Standard Deviations for Five Administrations in Group Two Situations - Educational Television
N=323

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	35.6	34.6	33.6	33.1	32.9
	Std Dev	9.3	8.8	9.0	9.4	9.3
Expectation	Mean	12.0	11.4	10.9	10.6	10.4
	Std Dev	4.0	3.9	3.9	4.1	4.1
Content	Mean	14.0	13.3	13.0	12.6	12.6
	Std Dev	3.2	3.3	3.1	3.2	3.3
Total	Mean	61.4	59.2	57.4	56.4	55.9
	Std Dev	14.6	14.1	14.4	14.9	15.0

Educational Television

	N
CU, Anthropology, Small Room ETV	34
U of Mo., Agricultural Economics	55
U of Mo., General Psychology	165
CU, Anthropology, Large Room ETV	69
	323

to decrease proportionally faster between the first and second and the second and third administrations than between the third and fourth or the fourth and fifth. Variation among scores within administrations remained relatively constant, however.

Inspection of the analyses reported in Tables 38 through 41 reveals that the attitude change for each attitude area is best characterized by a quadratic regression equation. This indicates that there was a "leveling off" of attitude change after the third administration. It is conceivable that either students were reacting to the novelty of the medium or that an adjustment period was necessary during the early periods of the course.

Group Three Situation - Programed Anatomy Laboratory

The single situation comprising Group Three consisted of the Programed Anatomy Laboratory course described on page 50 in relation to characteristics of learners and attitude change. For the regression analysis, 74 of the 78 original cases were involved. It will be recalled that this group of 80 freshman veterinary medicine students met daily for a partially programed lecture and a programed laboratory. As is frequently found among students in the early phases of professional training, motivation to achieve was high.

Group Three Results

Inspection of the means and standard deviations in Table 42 indicates a rather consistently increasing decrease in the favorability of attitudes across the five administrations and a tendency for the attitude scores to become less variable throughout the course. Particularly noteworthy is the high Content mean score. It is likely that

Table 38

Adjusted Linear, Quadratic Regression for Method in Group Two - Educational Television

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1615	2000095.00		
Mean	1	1863745.36		
Cases	322	108413.63	336.68	22.41**
Lin + Quad Reg	2	1599.89	799.94	53.25**
Linear	1	1490.28	1490.28	99.20**
Quadratic	1	109.60	109.60	7.29**
Reg Dev	644	16631.70	25.82	1.71
Linear	322	10409.31	32.32	2.15
Quadratic	322	6222.39	19.32	1.28
Residual	646	9704.39	15.02	

Mean 33.9 Beta 1 -.6792 Beta 2 .1556

Table 39

Adjusted Linear, Quadratic Regression for Expectation in Group Two - Educational Television

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1615	223906.00		
Mean	1	197466.35		
Cases	322	20355.64	63.21	21.95**
Lin + Quad Reg	2	501.72	250.86	87.13**
Linear	1	481.42	481.42	167.22**
Quadratic	1	20.30	20.30	7.05**
Reg Dev	644	3722.44	5.78	2.00**
Linear	322	2243.67	6.96	2.42**
Quadratic	322	1478.76	4.59	1.59**
Residual	646	1859.82	2.87	

Mean 11.0 Beta 1 -.3860 Beta 2 .0670

Table 40

Adjusted Linear, Quadratic Regression for Content in Group Two - Educational Television

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1615	294588.00		
Mean	1	277451.53		
Cases	322	12402.06	38.51	15.59**
Lin + Quad Reg	2	438.83	219.41	88.83**
Linear	1	391.83	391.83	158.64**
Quadratic	1	46.99	46.99	19.02**
Reg Dev	644	2700.02	4.19	1.69**
Linear	322	1680.66	5.21	2.11**
Quadratic	322	1019.35	3.16	1.28**
Residual	646	1595.54	2.46	

Mean 13.1 Beta 1 -.3482 Beta 2 .1019

Table 41

Adjusted Linear, Quadratic Regression for Total in Group Two - Educational Television

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1615	5791474.00		
Mean	1	5440983.03		
Cases	322	281820.16	875.21	27.61**
Lin + Quad Reg	2	6738.30	3369.15	106.28**
Linear	1	6319.60	6319.60	199.36**
Quadratic	1	418.70	418.70	13.20**
Reg Dev	644	41455.57	64.37	2.03**
Linear	322	26517.99	82.35	2.59**
Quadratic	322	14937.58	46.39	1.46**
Residual	646	20476.91	31.69	

Mean 58.0 Beta 1 -1.3987 Beta 2 .3042

Table 42

Means and Standard Deviations for Five Administrations in the Group Three Situation - Programed Anatomy Laboratory

N=74

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	44.8	43.8	42.6	40.7	38.8
	Std Dev	5.1	5.9	4.3	4.4	4.2
Expectation	Mean	13.9	13.7	13.2	12.7	11.8
	Std Dev	2.6	2.5	2.5	2.4	2.3
Content	Mean	15.9	15.2	14.6	14.1	13.6
	Std Dev	3.3	3.1	3.1	3.0	2.9
Total	Mean	74.5	72.7	70.9	67.6	63.7
	Std Dev	10.6	11.3	9.9	9.8	9.7

	N
Programed Anatomy Laboratory, CSU	74

this score reflects the relatively high interest of the students in the subject matter.

Examination of Tables 43 through 46 reveals that quadratic equations characterized the Method, Expectation and Total attitude scores. These equations differ from those reported for Groups One and Two, however, in that the decrease in favorability of attitudes is proportially greater during the latter portions of the course.

This course consisted of both lecture and programed instruction. Students may have experienced difficulty through changing between the two methods. It will be recalled that the Radiation Detection and Camera Repair students reflected a pronounced decrease in favorability of attitudes when they returned to lectures following a programed instruction unit. It may be that the Anatomy students experienced the same phenomenon.

Group Four Situations - High School Language, Media Emphasis

Eight Spanish classes in North Plainfield High School, North Plainfield, New Jersey, comprised the situations in Group Four. In these classes covering four levels of instruction, extensive use was made of films, tapes, records, and laboratory equipment. The pupils and teachers at each level had used all the media previously, and were well oriented to them. In-service seminars were held frequently during the year for the teachers.

The length of the learning experience involved in Group Four was one academic year. Thus the five administrations of the scales were made at seven-week intervals.

Table 43

Adjusted Linear, Quadratic Regression for Method in Group Three - Programed Anatomy Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	370	670122.00		
Mean	1	651336.69		
Cases	73	11470.50	157.13	12.16**
Lin + Quad Reg	2	2037.00	1018.50	78.84**
Linear	1	1952.43	1952.43	151.13**
Quadratic	1	84.57	84.57	6.54**
Reg Dev	146	3365.90	23.05	1.78**
Linear	73	2299.76	31.50	2.43**
Quadratic	73	1066.14	14.60	1.13
Residual	148	1911.88	12.91	

Mean 41.9 Beta 1 -1.6243 Beta 2 -.2857

Table 44

Adjusted Linear, Quadratic Regression for Expectation in Group Three - Programed Anatomy Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	370	64773.00		
Mean	1	62504.00		
Cases	73	1162.59	15.92	7.23**
Lin + Quad Reg	2	214.28	107.14	48.64**
Linear	1	203.43	203.43	92.37**
Quadratic	1	10.84	10.84	4.92**
Reg Dev	146	566.17	3.87	1.76**
Linear	73	331.16	4.53	2.05**
Quadratic	73	235.01	3.21	1.46*
Residual	148	325.94	2.20	

Mean 12.9 Beta 1 -.5243 Beta 2 -.1023

Table 45

Adjusted Linear, Quadratic Regression for Content
in Group Three - Programed Anatomy Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	370	82430.00		
Mean	1	79982.70		
Cases	73	1364.49	18.69	8.70**
Lin + Quad Reg	2	219.63	109.81	51.13**
Linear	1	218.38	218.38	101.69**
Quadratic	1	1.25	1.25	.58
Reg Dev	146	545.33	3.73	1.73**
Linear	73	375.01	5.13	2.39**
Quadratic	73	170.32	2.33	1.08
Residual	148	317.82	2.14	

Mean 14.7 Beta 1 -.5432 Beta 2 .0347

Table 46

Adjusted Linear, Quadratic Regression for Total
in Group Three - Programed Anatomy Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	370	1843162.00		
Mean	1	1798190.36		
Cases	73	27647.63	378.73	13.89**
Lin + Quad Reg	2	5389.77	2694.88	98.85**
Linear	1	5244.45	5244.45	192.37**
Quadratic	1	145.31	145.31	5.33**
Reg Dev	146	7899.54	54.10	1.98**
Linear	73	5798.14	79.42	2.91**
Quadratic	73	2101.40	28.78	1.05
Residual	148	4034.68	27.26	

Mean 69.7 Beta 1 -2.6621 Beta 2 -.3745

Group Four Results

Inspection of the means and standard deviations in Table 47 reveals a tendency for the variability among scores to increase from the first to the fifth administrations. For all three area scores and for the total score, there was a decrease in favorability of attitudes. Greatest decrease tended to be between the first and second administrations.

Examination of Tables 48 through 51 reveals that the attitude change trends for Method, Content, and Total score were characterized by a linear relationship. The scores for Expectation were characterized by a slight curvilinear relationship. In general, attitudes remained relatively stable within this group of situations, with no pronounced changes between administrations.

Group Five Situations - High School Language, Conventional Laboratory

Seventeen sections were involved in the three foreign language situations in Group Five. Classes met daily with a laboratory session twice each week. The audio lingual laboratories consisted of semi-isolated booths equipped with earphones, microphone and a tape recorder. Students listened to words and phrases, repeated words and phrases, participated in group conversation, and responded to test materials. A typical laboratory session lasted about twenty-eight minutes. The five administrations covered one academic year.

Group Five Results

Inspection of the standard deviations in Table 52 reveals a tendency toward greater variability among scores as the year progressed. Changes in mean score reflect a relatively pronounced

Table 47

Means and Standard Deviations for Five Administrations in Group Four Situations - High School Language, Media Emphasis N=216

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	40.7	38.9	38.1	38.2	36.4
	Std Dev	9.5	8.9	9.7	9.4	10.1
Expectation	Mean	12.8	12.0	11.5	11.6	11.5
	Std Dev	3.8	4.2	4.1	4.1	4.2
Content	Mean	13.1	12.9	12.3	12.1	11.5
	Std Dev	3.2	3.4	3.3	3.4	3.2
Total	Mean	66.6	63.8	61.9	60.8	58.9
	Std Dev	14.9	14.9	15.8	16.3	16.2

High School Language, Media Emphasis

	N
Spanish III	25
Spanish 8	25
Spanish II	89
Spanish I	77
	216

Table 48

Adjusted Linear, Quadratic Regression for Method Group Four - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1080	1698197.00		
Mean	1	1597982.26		
Cases	215	79183.13	368.29	22.26**
Lin + Quad Reg	2	1860.36	930.18	56.23**
Linear	1	1850.00	1850.00	111.84**
Quadratic	1	10.36	10.36	.62
Reg Dev	430	12025.86	27.96	1.69**
Linear	215	8429.29	39.20	2.37**
Quadratic	215	3596.56	16.72	1.01
Residual	432	7145.37	16.54	

Mean 38.4 Beta 1 -.9254 Beta 2 .0585

Table 49

Adjusted Linear, Quadratic Regression for Expectation Group Four - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1080	168571.00		
Mean	1	150214.04		
Cases	215	12948.15	60.22	12.94**
Lin + Quad Reg	2	343.88	171.94	36.96**
Linear	1	327.44	327.44	70.38**
Quadratic	1	16.44	16.44	3.53**
Reg Dev	430	3055.25	7.10	1.52**
Linear	215	2035.05	9.46	2.03**
Quadratic	215	1020.19	4.74	1.02
Residual	432	2009.65	4.65	

Mean 11.7 Beta 1 -.3893 Beta 2 .0737

Table 50

Adjusted Linear, Quadratic Regression for Content Group Four - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1080	177877.00		
Mean	1	165738.55		
Cases	215	8280.44	38.51	11.45**
Lin + Quad Reg	2	329.36	164.68	48.96**
Linear	1	329.00	329.00	97.82**
Quadratic	1	.36	.36	.10
Reg Dev	430	2075.66	4.82	1.43**
Linear	215	1319.09	6.13	1.82
Quadratic	215	756.56	3.51	1.04
Residual	432	1452.97	3.36	

Mean 12.3 Beta 1 -.3902 Beta 2 -.0109

Table 51

Adjusted Linear, Quadratic Regression for Total Group Four - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1080	4500260.00		
Mean	1	4233262.45		
Cases	215	211743.14	984.85	24.57**
Lin + Quad Reg	2	6648.86	3324.43	82.94**
Linear	1	6618.50	6618.50	165.13**
Quadratic	1	30.36	30.36	.75
Reg Dev	430	31291.30	72.77	1.81**
Linear	215	21451.59	99.77	2.48**
Quadratic	215	9839.71	45.76	1.14
Residual	432	17314.22	40.07	

Mean 62.6 Beta 1 -1.7504 Beta 2 .1001

Table 52

Means and Standard Deviation for Five Administrations
in Group Five Situations
High School Language, Conventional Laboratory
N=385

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	38.7	35.3	33.5	32.8	32.2
	Std Dev	9.7	9.5	9.6	9.7	10.1
Expectation	Mean	13.2	12.0	11.3	10.9	10.7
	Std Dev	4.2	4.0	4.1	4.1	4.4
Content	Mean	6.7	6.5	6.1	6.2	6.1
	Std Dev	1.5	1.5	1.7	1.7	1.8
Total	Mean	58.4	53.8	50.9	49.9	48.9
	Std Dev	13.5	13.1	13.3	13.4	14.2

High School Language, Conventional Laboratory

	N
Spanish IV	12
Spanish III	57
Spanish II	96
Spanish I	32
Spanish III	5
German II	35
German I	53
French III	32
French II	30
French I	33
	385

decrease in favorability of attitudes between the first and second administration, followed by lesser decreases between subsequent administrations. For all areas and for total score, there was a significant contribution to explanation in variance contributed by the quadratic equation.

Inspection of Tables 53 through 56 reveals the curvilinear nature of the attitude score changes in Group Five. In all instances there was a significant contribution from the quadratic equation on the linear relationship.

Group Six Situations - Small University Classes

Thirteen classes of three subject matter areas, educational psychology, beginning German, and English composition, comprised the Group Six situations. Enrollment within the classes varied from twenty-five to forty. Instructors in all the classes had taught their particular course at least once previously. The five educational psychology classes extended over one semester whereas the other eight classes covered one quarter.

Group Six Results

Inspection of the means and standard deviations in Table 57 indicates considerable stability in variation among the five administrations, as well as considerable stability among mean scores within areas. Although attitudes declined gradually throughout the learning experience, changes between adjacent administrations are relatively small.

Examination of Tables 58 through 61 reveals that the explanation of variation associated with Quadratic Regression was non-significant for Expectation where the Quadratic Regression was significant at only the five per cent level. In the small university classes, the attitude change relationship was essentially linear.

Table 53

Adjusted Linear, Quadratic Regression for Method Group Five - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1925	2483967.00		
Mean	1	2291817.78		
Cases	384	136703.61	355.99	17.33**
Lin + Quad Reg	2	10566.91	5283.45	257.21**
Linear	1	9331.95	9331.95	454.31**
Quadratic	1	1234.95	1234.95	60.12**
Reg Dev	768	29062.28	37.84	1.84**
Linear	384	18856.24	49.10	2.39**
Quadratic	384	10206.04	26.57	1.29**
Residual	770	15816.39	20.54	

Mean 34.5 Beta 1 -1.5568 Beta 2 .4786

Table 54

Adjusted Linear, Quadratic Regression for Expectation Group Five - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1925	293530.00		
Mean	1	258749.67		
Cases	384	22572.72	58.73	11.78**
Lin + Quad Reg	2	1594.97	797.48	159.83**
Linear	1	1456.47	1456.47	291.91**
Quadratic	1	138.49	138.49	27.75**
Reg Dev	768	6770.85	8.81	1.76**
Linear	384	4211.92	10.96	2.19**
Quadratic	384	2558.93	6.66	1.33**
Residual	770	3841.77	4.98	

Mean 11.5 Beta 1 -.6150 Beta 2 .1602

Table 55

Adjusted Linear, Quadratic Regression for Content Group Five - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1925	81454.00		
Mean	1	76132.59		
Cases	384	3172.20	8.26	6.99**
Lin + Quad Reg	2	109.95	54.97	46.55**
Linear	1	96.33	96.33	81.56**
Quadratic	1	13.62	13.62	11.53**
Reg Dev	768	1129.87	1.47	1.24**
Linear	384	643.56	1.67	1.41**
Quadratic	384	486.30	1.26	1.07
Residual	770	909.37	1.18	

Mean 6.2 Beta 1 -.1581 Beta 2 .0502

Table 56

Adjusted Linear, Quadratic Regression for Total Group Five - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1925	5651903.00		
Mean	1	5279406.60		
Cases	384	268575.19	699.41	19.85**
Lin + Quad Reg	2	22656.17	11328.08	321.59**
Linear	1	20160.02	20160.02	572.32**
Quadratic	1	2496.14	2496.14	70.86**
Reg Dev	768	54141.76	70.49	2.00**
Linear	384	35517.77	92.49	2.62**
Quadratic	384	18623.99	48.49	1.37**
Residual	770	27123.25	35.22	

Mean 52.3 Beta 1 -2.2883 Beta 2 .6805

Table 57

Means and Standard Deviations for Five Administrations
in Group Six Situations - Small University Classes
N=363

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	34.6	34.1	34.1	33.8	33.4
	Std Dev	9.2	9.1	8.9	8.9	9.3
Expectation	Mean	9.9	9.9	9.9	9.7	9.4
	Std Dev	4.6	4.4	5.0	4.4	4.7
Content	Mean	12.1	11.9	11.8	11.7	11.5
	Std Dev	3.9	3.7	3.5	3.6	3.7
Total	Mean	56.6	55.8	55.5	54.9	54.3
	Std Dev	15.9	15.3	15.5	15.5	15.7

Small University Classes

U of Mo., Educational Psychology, 5 classes	152
CSU, Conventional Beginning German, 5 classes	125
CSU, Conventional English Composition, 3 classes	86
	363

Table 58

Adjusted Linear, Quadratic Regression for Method
Group Six - Small University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1815	2251315.00		
Mean	1	2101065.01		
Cases	362	120921.18	334.03	24.14**
Lin + Quad Reg	2	264.88	132.44	9.57**
Linear	1	264.57	264.57	19.12**
Quadratic	1	.31	.31	.02
Reg Dev	724	19020.48	26.27	1.89**
Linear	362	12339.22	34.08	2.46**
Quadratic	362	6681.25	18.45	1.33**
Residual	726	10043.42	13.83	

Mean 34.0 Beta 1 -.2699 Beta 2 -.0078

Table 59

Adjusted Linear, Quadratic Regression for Expectation
Group Six - Small University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1815	211759.00		
Mean	1	172865.21		
Cases	362	30290.98	83.67	23.85**
Lin + Quad Reg	2	66.23	33.11	9.44**
Linear	1	50.69	50.69	14.45**
Quadratic	1	15.53	15.53	4.42*
Reg Dev	724	5990.16	8.27	2.35**
Linear	362	3483.20	9.62	2.74**
Quadratic	362	2506.96	6.92	1.97**
Residual	726	2546.39	3.50	

Mean 9.7 Beta 1 -.1181 Beta 2 -.0552

Table 60

Adjusted Linear, Quadratic Regression for Content
Group Six - Small University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1815	276586.00		
Mean	1	252225.24		
Cases	362	19484.75	53.82	21.08**
Lin + Quad Reg	2	71.97	35.98	14.10**
Linear	1	69.42	69.42	27.20**
Quadratic	1	2.55	2.55	1.00
Reg Dev	724	2951.10	4.07	1.59**
Linear	362	1618.37	4.47	1.75**
Quadratic	362	1332.72	3.68	1.44**
Residual	726	1852.91	2.55	

Mean 11.7 Beta 1 -.1382 Beta 2 .0224

Table 61

Adjusted Linear, Quadratic Regression for Total
Group Six - Samll University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	1815	6040529.00		
Mean	1	5600703.76		
Cases	362	367388.43	1014.88	33.64**
Lin + Quad Reg	2	1013.11	506.55	16.79**
Linear	1	1002.88	1002.88	33.24**
Quadratic	1	10.22	10.22	.33
Reg Dev	724	49524.02	68.40	2.26**
Linear	362	31999.11	88.39	2.93**
Quadratic	362	17524.91	48.41	1.60**
Residual	726	21899.65	30.16	

Mean 55.5 Beta 1 -.5256 Beta 2 -.0448

Group Seven Situations - Large University Classes

Four classes involving two subject matter areas comprised the large university class situations in Group Seven. Instructors in these classes were all experienced lecturers with ten to thirty years' experience working with large student groups. The educational psychology classes covered one semester and the English classes covered one quarter.

Group Seven Results

Inspection of Table 62 reflects the relative stability of standard deviations throughout the five administrations in all areas. Mean scores reflect slightly less favorable attitudes near the middle of the courses than at the beginning or end for Method, Expectation, and Total scores.

Tables 63 through 66 reflect considerable variation among the attitude change eauations. The Method scores were characterized by a quadratic rather than a linear relationship; the Content scores failed to reveal any significant relationship; but the Expectation and Total scores revealed highly significant linear relationships with an additional contribution from the quadratic equation. Apparently attitude toward the content of these two subject matter areas was too inconsistent from one administration to the next to be measure reliability.

Form of Scale for Groups Eight through Eleven

In Groups Eight through Eleven, the Language Attitude Scale was used as the criterion for attitude change. It will be recalled that this scale was designed to yield five rather than four area scores. In addition, only one form of this scale was administered. In all

Table 62

Means and Standard Deviations for Five Administrations in Group Seven Administrations - Large University Classes
N=598

Area	Statistic	Administration 1	2	3	4	5
Method	Mean	30.8	30.6	29.8	30.4	30.4
	Std Dev	9.3	9.2	8.9	8.9	8.9
Expectation	Mean	9.4	9.2	8.9	9.0	9.3
	Std Dev	4.3	4.2	4.0	4.1	4.2
Content	Mean	11.2	10.9	11.0	11.0	10.9
	Std Dev	3.6	3.4	3.0	3.3	3.5
Total	Mean	51.6	50.9	49.9	50.7	50.6
	Std Dev	15.5	15.1	14.6	14.9	15.0

Large University Classes

		N
	Conventional Anthropology, CU	53
(2 classes)	Educational Psychology, U of Mo.	161
(2 classes)	Large English	384
		598

Table 63

Adjusted Linear, Quadratic Regression for Method Group Seven - Large University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2990	3007092.00		
Mean	1	2762508.84		
Cases	597	181742.75	304.42	16.52**
Lin + Quad Reg	2	196.75	98.37	5.33*
Linear	1	51.69	51.69	2.80
Quadratic	1	145.05	145.05	7.87**
Reg Dev	1194	40604.78	34.00	1.84**
Linear	597	22830.70	38.24	2.07**
Quadratic	597	17774.08	29.77	1.61**
Residual	1196	22038.85	18.42	

Mean 30.3 Beta 1 -.0929 Beta 2 .1316

Table 64

Adjusted Linear, Quadratic Regression for Expectation Group Seven - Large University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2990	300917.00		
Mean	1	248950.53		
Cases	597	36712.86	61.49	13.43**
Lin + Quad Reg	2	100.41	50.20	10.96**
Linear	1	64.28	64.28	14.04**
Quadratic	1	36.13	36.13	7.89**
Reg Dev	1194	9678.61	8.10	1.77**
Linear	597	5641.31	9.44	2.06**
Quadratic	597	4037.29	6.76	1.47**
Residual	1196	5474.57	4.57	

Mean 9.1 Beta 1 -.1036 Beta 2 .0656

Table 65

Adjusted Linear, Quadratic Regression for Content
Group Seven - Large University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2990	398845.00		
Mean	1	363883.01		
Cases	597	23824.38	39.90	11.56**
Lin + Quad Reg	2	6.91	3.45	1.00
Linear	1	5.41	5.41	1.56
Quadratic	1	1.49	1.49	.43
Reg Dev	1194	7002.22	5.86	1.69**
Linear	597	3803.58	6.37	1.84**
Quadratic	597	3198.64	5.35	1.55**
Residual	1196	4128.45	3.45	

Mean 11.0 Beta 1 -.0301 Beta 2 .0133

Table 66

Adjusted Linear, Quadratic Regression for Total
Group Seven - Large University Classes

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2990	8373140.00		
Mean	1	7699054.23		
Cases	597	507932.16	850.80	18.64**
Lin + Quad Reg	2	637.61	318.80	6.98**
Linear	1	314.77	314.77	6.89**
Quadratic	1	322.83	322.83	7.07**
Reg Dev	1194	110949.47	92.92	2.03**
Linear	597	63897.02	107.03	2.34**
Quadratic	597	47052.45	78.81	1.72**
Residual	1196	54566.51	45.62	

Mean 50.7 Beta 1 -.2294 Beta 2 .1963

situations where the language scale was used, however, the learning experiences encompassed an academic year, the scales being administered seven weeks apart. All classes in Groups Eight through Eleven were from the Jefferson County Public Schools, Lakewood, Colorado.

Group Eight Situations - High School Language, Conventional Laboratory

Seven classes in high school German, Spanish and French made up the Group Eight situations. All Group Eight situations included a conventional audio-lingual language laboratory which met twice each week. Films were used primarily to convey information about geographic areas and cultures rather than to instruct in the language itself.

Group Eight Results

Inspection of the standard deviations for the five administrations reported in Table 67 reveals that the variability remained relatively constant, with a slight tendency toward greater variability at the fifth administration in two areas. Although the trend of mean scores in Table 67 is slightly downward, scores were relatively comparable for the first and second, and third and fourth administrations.

Tables 68 through 72 reveal that the Laboratory, Textbook, and Total score changes were characterized by a linear relationship, but that the Content and Film area score changes were essentially curvilinear.

Group Nine Situations - High School Language, Media Emphasis

Teachers in the eight classes comprising Group Nine all used films and tapes extensively in their class sessions. Although textbook materials were available, only limited grammar and translation assignments were made.

Table 67

Means and Standard Deviations for Five Administrations in Group Eight Situations
High School Language, Conventional Laboratory
N=121

		Administration				
Area	Statistic	1	2	3	4	5
Laboratory	Mean	32.7	31.7	31.5	31.8	30.7
	Std Dev	9.9	9.7	9.3	9.1	8.7
Film	Mean	13.0	13.2	12.6	12.5	11.9
	Std Dev	3.5	3.4	3.5	3.1	3.4
Content	Mean	15.2	15.5	15.2	14.1	13.5
	Std Dev	5.0	4.9	4.5	4.8	5.0
Textbook	Mean	6.9	6.8	6.5	6.5	6.6
	Std Dev	3.7	3.7	3.3	3.3	3.5
Total	Mean	67.9	67.2	65.4	64.6	62.3
	Std Dev	14.9	13.2	12.2	12.3	13.8

High School Language, Conventional Laboratory

German I, Period 1	19
German II, Period 2	5
Spanish I, Period 2	21
Spanish II, Period 6	20
French I, Period 1	27
French I, Period 3	22
French III, Period 4	7
	121

Table 68

Adjusted Linear, Quadratic Regression for Laboratory
Group Eight - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	605	659052.00		
Mean	1	606152.89		
Cases	120	38824.70	323.53	20.37**
Lin + Quad Reg	2	181.86	90.93	5.72**
Linear	1	181.01	181.01	11.40**
Quadratic	1	.85	.85	.05
Reg Dev	240	10050.53	41.87	2.63**
Linear	120	7219.38	60.16	3.78**
Quadratic	120	2831.14	23.59	1.48**
Residual	242	3841.99	15.87	

Mean 31.6 Beta 1 -.3867 Beta 2 .0224

Table 69

Adjusted Linear, Quadratic Regression for Film
Group Eight - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	605	103523.00		
Mean	1	96503.93		
Cases	120	4845.46	40.37	15.66**
Lin + Quad Reg	2	111.83	55.91	21.69**
Linear	1	101.23	101.23	39.27**
Quadratic	1	10.59	10.59	4.11*
Reg Dev	240	1437.93	5.99	2.32**
Linear	120	1060.96	8.84	3.42**
Quadratic	120	376.97	3.14	1.21
Residual	242	623.82	2.57	

Mean 12.6 Beta 1 -.2892 Beta 2 -.0791

Table 70

Adjusted Linear, Quadratic Regression for Content Group Eight - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	605	145403.00		
Mean	1	130955.04		
Cases	120	11321.55	94.34	28.05**
Lin + Quad Reg	2	328.43	164.21	48.83**
Linear	1	277.05	277.05	82.38**
Quadratic	1	51.37	51.37	15.27**
Reg Dev	240	1984.14	8.26	2.45**
Linear	120	1369.44	11.41	3.39**
Quadratic	120	614.69	5.12	1.52**
Residual	242	813.82	3.36	

Mean 14.7 Beta 1 -.4785 Beta 2 -.1741

Table 71

Adjusted Linear, Quadratic Regression for Textbook Group Eight - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	605	34221.00		
Mean	1	26831.14		
Cases	120	4974.65	41.45	12.01**
Lin + Quad Reg	2	22.10	11.05	3.20*
Linear	1	16.19	16.19	4.69*
Quadratic	1	5.90	5.90	1.71
Reg Dev	240	1557.89	6.49	1.88**
Linear	120	976.80	8.14	2.35**
Quadratic	120	581.09	4.84	1.40*
Residual	242	835.19	3.45	

Mean 6.6 Beta 1 -.1157 Beta 2 .0590

Table 72

Adjusted Linear, Quadratic Regression for Total in Group Eight - High School Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	605	2702074.00		
Mean	1	2593309.25		
Cases	120	77817.54	648.47	18.37**
Lin + Quad Reg	2	2319.12	1159.56	32.85**
Linear	1	2269.13	2269.13	64.29**
Quadratic	1	49.98	49.98	1.41
Reg Dev	240	20086.99	83.69	2.37**
Linear	120	14738.76	122.82	3.48**
Quadratic	120	5348.22	44.56	1.26*
Residual	242	8541.08	35.29	

Mean 65.4 Beta 1 -1.3694 Beta 2 -.1717

Group Nine Results

Changes in attitude score reflected in Table 73 were relatively small after the initial administration. Variability among administrations was constant with no pattern of increase or decrease throughout the five administrations. The most pronounced change in Total score occurred between the first and second administrations, although a slight increase in favorable attitudes resulted for the Textbook score during this period. Mean scores for the last four administrations remained remarkably constant, with attitude toward films showing a slight increase.

Tables 74 through 78 indicate that no discernible pattern of attitude change could be identified for the Film subscores, but that the other score changes were significantly curvilinear. In this group of media emphasis situations attitudes tended to decrease initially but to hold relatively constant thereafter.

Group Ten Situations - Junior High Language, Conventional Laboratory

In the twenty-one French and Spanish classes comprising Group Ten, the laboratory experiences were similar to those involved in the high school situations of Group Five. The Group Ten students were at the junior high school level, however.

Group Ten Results

Although the standard deviations shown in Table 79 were relatively constant, there was a slight tendency toward greater variability in attitudes as the learning progressed. In four of the five areas of attitude change reported in Tables 80 through 84, a pronounced linear relationship was found. In the case of Films, no significant pattern of change was discernible.

Table 73

Means and Standard Deviations for Five Administrations in Group Nine Situations
High School Language, Media Emphasis
N=115

Area	Statistic	Administration 1	2	3	4	5
Laboratory	Mean	29.3	27.0	26.0	26.9	26.9
	Std Dev	9.6	10.2	10.4	10.9	10.1
Film	Mean	9.7	9.4	9.5	9.3	9.7
	Std Dev	3.6	3.7	3.2	3.6	3.5
Content	Mean	15.1	14.6	13.9	13.4	13.3
	Std Dev	4.2	3.7	3.8	4.7	4.7
Textbook	Mean	9.6	9.7	9.9	9.8	9.2
	Std Dev	3.4	3.6	3.3	3.4	3.5
Total	Mean	63.6	60.5	59.4	59.6	59.3
	Std Dev	13.1	13.4	12.7	13.4	13.0

High School Language, Media Emphasis

	N
Spanish III, Period 3	23
Spanish II, Period 2	9
French I, Period 1	7
German I, Period 3	16
German II, Period 6	10
German I, Period 7	16
Spanish I, Period 2	20
French II, Period 3	14
	115

Table 74

Adjusted Linear, Quadratic Regression for Laboratory
in Group Nine - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	575	487453.00		
Mean	1	426769.08		
Cases	114	50173.91	440.12	27.47**
Lin + Quad Reg	2	601.14	300.57	18.76**
Linear	1	257.33	257.33	16.06**
Quadratic	1	343.81	343.81	21.46**
Reg Dev	228	6224.68	27.30	1.70**
Linear	114	3564.06	31.26	1.95**
Quadratic	114	2660.61	23.33	1.46**
Residual	230	3684.17	16.01	

Mean 27.2 Beta 1 -.4730 Beta 2 .4621

Table 75

Adjusted Linear, Quadratic Regression for Film
in Group Nine - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	575	59542.00		
Mean	1	52455.76		
Cases	114	4825.03	42.32	9.18**
Lin + Quad Reg	2	10.85	5.42	1.17
Linear	1	.19	.19	.04
Quadratic	1	10.65	10.65	2.31
Reg Dev	228	1190.11	5.21	1.13
Linear	114	751.70	6.59	1.43**
Quadratic	114	438.41	3.84	.83
Residual	230	1060.22	4.60	

Mean 9.5 Beta 1 -.0130 Beta 2 .0813

Table 76

Adjusted Linear, Quadratic Regression for Content
Group Nine - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	575	124523.00		
Mean	1	113907.21		
Cases	114	7537.38	66.11	15.40**
Lin + Quad Reg	2	255.2481	127.62	29.72**
Linear	1	247.03	247.03	57.54**
Quadratic	1	8.21	8.21	1.91
Reg Dev	228	1835.72	8.05	1.87**
Linear	114	1213.86	10.64	2.48**
Quadratic	114	621.85	5.45	1.27
Residual	230	987.42	4.29	

Mean 14.0 Beta 1 -.4634 Beta 2 .0714

Table 77

Adjusted Linear, Quadratic Regression for Textbook
in Group Nine - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	575	60521.00		
Mean	1	53704.78		
Cases	114	4929.81	43.24	13.58**
Lin + Quad Reg	2	30.41	15.20	4.77**
Linear	1	7.04	7.04	2.21
Quadratic	1	23.37	23.37	7.34**
Reg Dev	228	1123.69	4.92	1.54**
Linear	114	681.35	5.97	1.87**
Quadratic	114	442.33	3.88	1.21
Residual	230	732.28	3.18	

Mean 9.6 Beta 1 -.0782 Beta 2 -.1204

Table 78

Adjusted Linear, Quadratic Regression for Total in Group Nine - High School Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean	F-Ratio
Total	575	2203326.00		
Mean	1	2103978.30		
Cases	114	78999.69	692.97	21.07**
Lin + Quad Reg	2	1431.93	715.96	21.77**
Linear	1	1059.84	1059.84	32.23**
Quadratic	1	372.09	372.09	11.31**
Reg Dev	228	11354.06	49.79	1.51**
Linear	114	6986.16	61.28	1.86**
Quadratic	114	4367.90	38.31	1.16
Residual	230	7561.99	32.87	

Mean 60.4 Beta 1 -.9600 Beta 2 .4807

Table 79

Means and Standard Deviations in Five Administrations in Group Ten Situations Junior High Language, Conventional Laboratory N=494

Area	Statistic	Administration 1	2	3	4	5
Laboratory	Mean	33.3	31.9	29.4	27.3	26.3
	Std Dev	10.9	11.6	12.1	12.0	12.2
Film	Mean	9.5	9.0	9.3	9.4	9.3
	Std Dev	3.9	4.1	3.8	4.0	4.0
Content	Mean	14.2	14.0	13.2	12.7	12.3
	Std Dev	4.9	4.9	5.3	5.2	5.5
Textbook	Mean	8.6	8.3	8.4	8.5	8.2
	Std Dev	3.7	3.8	3.9	3.7	3.8
Total	Mean	64.5	62.7	60.1	57.5	55.8
	Std Dev	16.3	15.2	15.8	15.7	16.9

Junior High Language, Conventional Laboratory

	N		N
French 7, Period 1	28	French 2, Period 5	16
French I, Period 7	28		
Spanish 7, Period 1	29	French 7, Period 6	27
French 7, Period 4	9	Spanish 8, Period 3	32
French 7, Period 3	16	Spanish II, Period 7	30
Spanish 7, Period 8	20	Spanish 7, Period 6	33
Spanish 8, Period 2	17	French 7, Period 4	34
Spanish 7, Period 8	22	French 9, Period 7	26
Spanish 8, Period 3	29	French I, Period 2	7
Spanish 9, Period 2	20	French II, Period 8	20
Spanish 8, Period 2	26		
Spanish I, Period 5	25		
			494

Table 80

Adjusted Linear, Quadratic Regression for Laboratory in Group Ten - Junior High Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2470	2533302.00		
Mean	1	2173478.90		
Cases	493	263617.89	534.72	21.96**
Lin + Quad Reg	2	17225.96	8612.98	353.74**
Linear	1	17178.32	17178.32	705.52**
Quadratic	1	47.63	47.63	1.95
Reg Dev	986	54923.17	55.70	2.28**
Linear	493	38762.67	78.62	3.22**
Quadratic	493	16160.50	32.77	1.34**
Residual	988	24056.05	24.34	

Mean 29.6 Beta 1 -1.8647 Beta 2 .0829

Table 81

Adjusted Linear, Quadratic Regression for Film in Group Ten - Junior High Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2470	251851.00		
Mean	1	212998.36		
Cases	493	26063.03	52.86	11.30**
Lin + Quad Reg	2	7.39	3.69	.79
Linear	1	.00	.00	.00
Quadratic	1	7.38	7.38	1.57
Reg Dev	986	8161.12	8.27	1.76**
Linear	493	5108.79	10.36	2.21**
Quadratic	493	3052.32	6.19	1.32**
Residual	988	4621.08	4.67	

Mean 9.2 Beta 1 -.0012 Beta 2 .0326

Table 82

Adjusted Linear, Quadratic Regression for Textbook in Group Ten - Junior High Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2470	209531.00		
Mean	1	174266.40		
Cases	493	23868.99	48.41	12.07**
Lin + Quad Reg	2	13.93	6.96	1.73**
Linear	1	13.89	13.89	3.46*
Quadratic	1	.03	.03	.00
Reg Dev	986	7419.55	7.52	1.87**
Linear	493	4825.30	9.78	2.44**
Quadratic	493	2594.24	5.26	1.31**
Residual	988	3962.11	4.01	

Mean 8.3 Beta 1 -.0530 Beta 2 .0023

Table 83

Adjusted Linear, Quadratic Regression for Content in Group Ten - Junior High Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2470	502817.00		
Mean	1	435695.55		
Cases	493	49903.84	101.22	17.63**
Lin + Quad Reg	2	1233.05	616.52	107.43**
Linear	1	1233.00	1233.00	214.85**
Quadratic	1	.05	.05	.01
Reg Dev	986	10314.59	10.46	1.82**
Linear	493	7103.79	14.40	2.51**
Quadratic	493	3210.79	6.51	1.13*
Residual	988	5669.94	5.73	

Mean 13.2 Beta 1 -.4995 Beta 2 -.0028

Table 84

Adjusted Linear, Quadratic Regression for Total in Group Ten - Junior High Language, Conventional Laboratory

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	2470	9619779.00		
Mean	1	8964989.16		
Cases	493	454370.23	921.64	17.65**
Lin + Quad Reg	2	26052.59	13026.29	249.47**
Linear	1	26045.57	26045.27	498.81**
Quadratic	1	7.31	7.31	.14
Reg Devq	986	122779.00	124.52	2.38**
Linear	493	84722.82	171.85	3.29**
Quadratic	493	38056.17	77.19	1.47**
Residual	988	51587.99	52.21	

Mean 60.2 Beta 1 -2.2961 Beta 2 .0325

Group Eleven Situations - Junior High Language, Media Emphasis

In the five junior high school classes comprising Group Eleven, a change from conventional laboratory experiences to media emphasis was made after six months of the academic year. Thus, junior high school students in Group Eleven experienced a shift of method during this learning experience. In a sense, individuals in this group are unique in that their media classification worked both conventional laboratory experience as well as media emphasis in the classroom.

Group Eleven Results

Although some changes in means and standard deviations between the third and fourth administration are apparent from the data in Table 85, the pattern is not consistent. In the areas of Textbook, Content and Film subscores, there was a shift toward more favorable attitudes at the last administration.

Tables 86 through 90 indicate that the trends for Laboratory, for Film and Total scores were linear, but that the Textbook and Content scores were curvilinear.

Summary of Results

Linear and quadratic regression equations were fitted to attitude scale scores from five administrations of scales to learners in eleven media groups. The media groups were formulated from individual class situations in which attitude scales had been administered five times throughout each learning experience. The scale used in seven groups yielded three area subscores and a total score, and the scale used in four groups yielded four area

Table 85

Means and Standard Deviations in Five Administrations
in Group Eleven Situations
Junior High Language, Media Emphasis
N=103

Area	Statistic	Administration 1	2	3	4	5
Laboratory	Mean	25.5	22.1	23.6	23.1	21.7
	Std Dev	13.1	13.7	14.9	13.6	12.7
Film	Mean	11.7	11.9	11.9	9.4	9.7
	Std Dev	3.6	3.7	4.3	5.5	4.6
Content	Mean	16.0	15.0	13.7	12.6	12.6
	Std Dev	4.1	4.8	5.2	5.5	5.8
Textbook	Mean	8.9	8.4	6.6	6.6	7.0
	Std Dev	3.8	4.1	4.3	4.5	4.3
Total	Mean	61.7	56.9	55.7	51.7	50.1
	Std Dev	14.9	16.5	18.3	21.0	20.9

Junior High Language, Media Emphasis

	N
French 7, Period 7	19
Spanish 7, Period 2	25
Spanish 8, Period 4	19
Spanish 1, Period 7	18
Spanish III, Period 5	22
	103

Table 86

Adjusted Linear, Quadratic Regression for Laboratory in Group Eleven - Junior High Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	515	373249.00		
Mean	1	277147.20		
Cases	102	71510.19	701.08	19.93**
Lin + Quad Reg	2	482.90	241.45	6.86**
Linear	1	450.25	450.25	12.80**
Quadratic	1	32.65	32.65	.92
Reg Dev	204	16864.23	82.66	2.35**
Linear	102	10283.24	100.81	2.86**
Quadratic	102	6580.98	64.51	1.83**
Residual	206	7244.45	35.16	

Mean 23.1 Beta 1 -.6611 Beta 2 .1504

Table 87

Adjusted Linear, Quadratic Regression for Film in Group Eleven - Junior High Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	515	71865.00		
Mean	1	61438.10		
Cases	102	4358.09	42.72	3.91**
Lin + Quad Reg	2	468.60	234.30	21.46**
Linear	1	430.63	430.63	39.44**
Quadratic	1	37.97	37.97	3.47
Reg Dev	204	3351.10	16.42	1.50**
Linear	102	2331.36	22.85	2.09**
Quadratic	102	1019.74	9.99	.91
Residual	206	2249.08	10.91	

Mean 10.9 Beta 1 -.6466 Beta 2 -.1622

Table 88

Adjusted Linear, Quadratic Regression for Textbook in Group Eleven - Junior High Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Sqaure	F-Ratio
Total	515	38419.00		
Mean	1	28886.30		
Cases	102	5894.29	57.78	8.53**
Lin + Quad Reg	2	408.93	204.46	30.20**
Linear	1	316.54	316.54	46.75**
Quadratic	1	92.38	92.38	13.64**
Reg Dev	204	1834.83	8.99	1.32*
Linear	102	1209.15	11.85	1.75**
Quadratic	102	625.68	6.13	.90
Residual	206	1394.62	6.77	

Mean 7.4 Beta 1 -.5543 Beta 2 .2531

Table 89

Adjusted Linear, Quadratic Regression for Content in Group Eleven - Junior High Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	515	114900.00		
Mean	1	100716.12		
Cases	102	8932.67	87.57	11.49**
Lin + Quad Reg	2	872.97	436.48	57.28**
Linear	1	841.51	841.51	110.44**
Quadratic	1	31.46	31.46	4.12*
Reg Dev	204	2808.62	13.76	1.80**
Linear	102	2076.58	20.35	2.67**
Quadratic	102	732.03	7.17	.94
Residual	206	1569.59	7.61	

Mean 13.9 Beta 1 -.9038 Beta 2 .1477

Table 90

Adjusted Linear, Quadratic Regression for Total in Group Eleven - Junior High Language, Media Emphasis

Source of Variation	DF	Sum of Squares	Mean Square	F-Ratio
Total	515	1759492.00		
Mean	1	1581171.44		
Cases	102	125532.55	1230.71	17.12**
Lin + Quad Reg	2	7482.35	3741.17	52.06**
Linear	1	7257.04	7257.04	101.00**
Quadratic	1	225.31	225.31	3.13
Reg Dev	204	30504.21	149.53	2.08**
Linear	102	20267.95	198.70	2.76**
Quadratic	102	10236.25	100.35	1.39*
Residual	206	14801.42	71.85	

Mean 55.4 Beta 1 -2.6543 Beta 2 .3952

subscores and a total score. Thus 48 analyses were made based upon the various area subscores and total score. The total score represented the sum of the area subscores.

In all instances involving total scale score, a significant contribution to the variation among individuals was made by one or both of the equations. In 34 of the 37 analyses involving area subscores, a comparable contribution to explanation in variation was found. Thus, it can be concluded that it is possible to identify measurable trends in learner attitudes toward the learning situation throughout a variety of situations involving different instructional media.

In all analyses made, the regression coefficient representing the slope of the regression line of attitude with time was negative. There was a tendency for attitudes toward the learning situation to become less favorable during formal learning experiences in all eleven instructional groupings. The "progressive disenchantment" reported in earlier investigations of direct television instruction is not unique to television as a medium of instruction.

In those instances in which new and unfamiliar media were used in the instructional situation, there appeared to be a "Hawthorne effect" in operation. In new and unfamiliar media situations, the decrease in favorability of attitudes during the initial portions of a learning experience was greater than during the later portions of the experience. This initial decrease was not as pronounced in instructional situations involving familiar instructional media such as small discussion classes or large lectures. This suggests the possibility of identifying procedures for an instructor who employs new media to maintain the relatively high initial attitude for the remainder of the learning experience.

Directions for Further Research

There are many facets of the "attitude change during learning" phenomenon which are appropriate for further investigation. Among these, four approaches seem especially pertinent. These include: 1) relating classroom procedures to change in attitudes within instructional media groups, 2) assessing the personal characteristics of learners whose attitude change data deviate substantially from the generalized equation for the group of which they are a part, 3) relating changes in attitude at different points in time during a learning experience to the final achievement outcomes of this experience, and 4) identifying the reasons which account for the decrease in favorability of attitudes during the learning experience.

In the learning situations involved in the present study, no attempt was made to influence the instructructional procedures used. The situations were selected because of their availability and their representativeness. The relative consistency of the findings across various media groupings, however, suggests that the relationship can be investigated most appropriately by systematically varying a given classroom teaching procedure in an experimental situation while controlling for teacher characteristics, student characteristics, and content of the learning experience.

In the data processing program employed in the present study, two regression equations were solved for each learner within each situation. In addition, two regression equations were identified for the entire group of learners in that situation. It would, therefore, be possible in subsequent studies to use this program analysis to contrast the personal characteristics of individual learners whose attitude change equations deviate widely from the equations for the remainder of their group. Such a procedure would contribute toward an understanding of the characteristics of learners whose changes in attitude toward the learning situation were atypical. If these characteristics were found to be related to different types of instructional media, this would have implications for selecting an appropriate type of medium for individuals with particular characteristics.

The fact that attitudes toward a learning situation do change throughout a learning experience suggests that there may be points in time which are more critical than others with respect to final achievement. It is suggested that the relationship between attitude scores obtained at different points in time during a learning experience and both final achievement and accumulative achievement be determined. In most research conducted to date involving attitudes and achievement, measures of attitude have been cross sectional rather than longitudinal. Longitudinal studies of attitude change during a learning experience should contribute substantially toward an understanding of the dynamic nature of attitude changes in relation to achievement.

In the present investigation, the learners' attitudes concerned were those related to the learning situation itself. No attempt was made to assess attitudes that were "educational outcomes" of a learning experience. The attitudes measured in this investigation became less favorable as the learning progressed. No attempt was made to assess non-intellective course outcomes. It would be desirable to explore the relationship between attitudes toward the learning situation and attitudes which are educational outcomes per se.

Finally, no attempt was made in this study to assess the reasons for the decline in favorable attitudes toward the learning situations involved. A variety of hypotheses about reasons for the decline can be postulated, but all remain to be tested. For example, it might be hypothesized that decrease in favorability of attitudes is related to pressure stemming from evaluation and grading practices; or inappropriate pacing; or lack of application of the material learned; or lack of variety in instructional techniques. These and many other possible explanations will require investigation before this phenomenon is completely understood.

VII. SUMMARY AND CONCLUSIONS

The central purpose of this research project was that of measuring longitudinal changes in attitudes toward formal learning experiences involving various instructional media. Attitudes investigated included: attitude toward methods of instruction employed in the learning situation, attitude toward expectation fulfillment, attitude toward subject matter content studied, and overall attitude as represented by a composite of the foregoing. Subordinate to the general purpose were the following specific purposes:

1. To determine the relationship of the number of administrations of attitude scales during a learning experience to changes in attitude and to final attitude scale scores obtained by learners.

2. To determine the relation of attitude change during learning to selected personal characteristics of the learners and to certain environmental factors in the learning situation.

3. To measure attitude change when programed instruction is interpolated between conventional learning experiences.

4. To estimate parameters of curves describing attitudinal changes by fitting linear and quadratic equations to longitudinal measurements of attitude obtained in situations involving different instructional media.

Five parallel forms of a 26-item scale measuring attitudes toward method, expectation, and content were developed for administration in a variety of media situations. Another somewhat similar scale was designed specifically for administration in audio lingual language laboratory situations. The scales were analyzed with respect to reliability and homogeneity in several situations. The median coefficient for twenty-eight estimates of total score reliability involving all five forms of the generalized scale was .87, and the media reliability for two estimates for the language scale was .90. Evidence was found to support the concept of obtaining separate subscores within each scale.

The general design employed for most of the situations studied involved administering the five forms of the scale in counterbalanced order to learners at five equally-spaced intervals throughout each learning experience, the first administration occuring at the end of the first one-fifth of the experience. Thus, for a one semester course, administrations were made at the end of the third, sixth, ninth, twelfth, and fifteenth weeks. More than six thousand subjects in over one hundred learning situations participated in one or more aspects of the study, although the final regression analyses were based upon approximately three thousand subjects in seventy-two situations classified into eleven media groups.

To determine the relationship between the number of scales administered in the learning situations and attitude change, varying patterns of from one to five scales were administered to students in educational television, audio lingual, and team teaching situations. It was found that, although attitude scale scores tended to decrease during the learning experiences, this decrease was not associated with the number of scales administered.

To determine the extent to which the attitudes measured in this study were related to some of the personal characteristics of the learners as well as to selected environmental factors (other than instructional media), five college level situations involving four media were selected for investigation. In the first situation (large lecture class in English composition), both personal and environmental factors were investigated. In the second and third situations (anthropology and general psychology taught by educational television), only environmental factors were explored. In the fourth situation (combination lecture and programed instruction), the relationship between change in attitude and change in performance was investigated. In the fifth situation (large and small classes in educational psychology), class size was studied. From the five situations studied in this phase of the investigation, extensive evidence was found to indicate that attitudes toward method, expectation, and content are related to the personal characteristics of the learners. Conversely, no evidence was found to indicate a relationship of consequence between environmental factors in the learning situation and attitude change. These findings strongly indicated the necessity of accounting for individual differences among curves of attitude change within media situations.

Although most of the hypotheses tested in this research project involved comparison of changes in attitude within formal learning experiences involving continuous exposure to one or more instructional media, one phase of the research was devoted to assessing the impact on attitudes when a "new media" situation is interpolated between conventional experiences within one course. Two situations were studied in which programed instructional units were interpolated between conventional lecture approaches. In one of the two fifteen-week learning situations, attitude scales were administered two weeks prior to the programed unit, at the start of the unit, half way through the unit, at the completion of the unit, and two weeks following the unit. Findings from this phase of the study were as follows: 1) Programed instruction interpolated between conventional experiences is associated with pronounced changes in student attitudes; 2) Students tend to reflect more favorable attitudes toward the learning situation during programed instruction than during conventional instruction; 3) Differential attitudes during programed and conventional instruction are especially critical for high ability students; and 4) Special attention to student attitudes by the instructor is warranted during the transition from programed instruction to conventional instruction.

In the final and central portion of the present study, the total scale scores and subscores for 3,049 learners in seventy-two situations were analyzed. The initial analyses consisted of computing means and standard deviations for all subjects after they had been grouped into eleven media groups according to the instructional medium utilized in each learning situation. Several quadratic equations were then fitted to the data using least squares, and the desirability of including the third, fourth, and fifth powers of each score in the equation was explored. It was found that the square of the scores would accomodate the curvilinearity involved and the following equation was selected for the final analyses: $Y = B_1X+B_2X^2+C$

Using the 1620 computer, a program was developed which divided the total variance among the five administrations into eight subdivisions, permitting the testing of seven hypotheses for each group and each score. The same program was utilized for the eleven groups as well as for the seventy-two situations. The eleven groups were as follows:

Programed Instruction
Educational Television
Programed Anatomy Laboratory
High School Language - Media Emphasis
High School Language - Conventional Laboratory
Small University Classes
Large University Classes
High School Language - Conventional Laboratory
High School Language - Media Emphasis
Junior High Language - Conventional Laboratory
Junior High Language - Media Emphasis

In all instances involving total scale score, a significant contribution to the variation among individuals was made by either the linear equation or the curvilinear equation. In 34 of the 37 analyses involving area subscores, a comparable contribution to explanation in variation was found. It was concluded that it is possible to identify measurable trends in learner attitudes toward the learning situation throughout a variety of situations involving different instructional media.

In all analyses made, the regression coefficient representing the slope of the regression line of attitude with time was negative. There was a tendency for attitudes toward the learning situation to become less favorable during formal learning experiences in all eleven instructional groupings. The "progressive disenchantment" reported in earlier investigations of direct television instruction is not unique to television as a medium of instruction.

In those instances in which new and unfamiliar media were used in the instructional situation, there appeared to be a "Hawthorne effect" in operation. In new and unfamiliar media situations, the decrease in favorability of attitudes during the initial portions of a learning experience was greater than during the later portions of the experience. This initial decrease was not as pronounced in instructional situations involving familiar instructional media such as small discussion classes or large lectures. This suggests the possibility of identifying procedures for an instructor who employs new media to maintain the relatively high initial attitude for the remainder of the learning experience.

Directions suggested for further research as the result of this study were as follows: 1) relating classroom procedures to change in attitudes within instructional media groups, 2) assessing the personal characteristics of learners whose attitude change data deviate substantially from the generalized equation for the group of which they are a part, 3) relating changes in attitude at different points in time during a learning experience to the final achievement outcomes of this experience, and 4) identifying the reasons which account for the decrease in favorability of attitudes during the learning experience.

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APPENDIX

A - Copies of Scales

B - Typical Instruction Sheet

C - Regression Data for Instructional Situations Comprising the Eleven Media Groups

Form A

____
Identification

ATTITUDE SCALE

This scale has been prepared so that you can indicate how you feel about this class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA if you strongly agree with the statement
A if you agree but not strongly so
N if you are neutral or undecided
D if you disagree but not strongly so
SD if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

1. I am satisfied with the methods used in teaching this class.......... SA A N D SD
2. My attitude toward this class is less favorable than it was.......... SA A N D SD
3. There is not enough contact between teacher and students in this class.......... SA A N D SD
4. I like the method used in teaching this class.......... SA A N D SD
5. Too much emphasis has been placed on topics that are unimportant..... SA A N D SD
6. I can see no advantage of this method of teaching over other methods. SA A N D SD
7. This class exceeds my highest expectation.......... SA A N D SD
8. Some students benefit more than others from the method of teaching this class.......... SA A N D SD
9. I have neutral feelings toward the subject matter of this class...... SA A N D SD
10. The presentation of this class is paced too fast.......... SA A N D SD
11. I am pleased with the teaching method used for this class.......... SA A N D SD
12. I am disappointed with this class.......... SA A N D SD
13. I find it easy to study this subject because I am really enthusiastic about it.......... SA A N D SD
14. I am forced by the method in this class to spend too much time on material I already know.......... SA A N D SD
15. Teachers of all classes should employ the method used to teach this class.......... SA A N D SD
16. Students do not participate enough in this class.......... SA A N D SD
17. The method used to teach this class delays our progress through the material.......... SA A N D SD
18. I remember the material in this class because of the method used to present it.......... SA A N D SD
19. I did not think I would learn as much in this class as I have......... SA A N D SD
20. The teaching method used in this class doesn't give me enough freedom.......... SA A N D SD
21. My attitude about the way this class is taught is one of enthusiasm.......... SA A N D SD
22. The method of instruction used in this class could be improved greatly.......... SA A N D SD
23. The topics presented in this class are well organized.......... SA A N D SD
24. This class has not fulfilled the hopes I had for it.......... SA A N D SD
25. I have not had a chance to review when I wanted to in this class..... SA A N D SD
26. The subject matter of this class is interesting.......... SA A N D SD

Form B

Identification

ATTITUDE SCALE

This scale has been prepared so that you can indicate how you feel about this class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA if you strongly agree with the statement
A if you agree but not strongly so
N if you are neutral or undecided
D if you disagree but not strongly so
SD if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

1. The methods used in teaching this class are satisfactory as far as I am concerned.. SA A N D SD
2. I am less favorable toward this class than I was.................... SA A N D SD
3. This class should have more contact between teacher and students... SA A N D SD
4. I like the teaching method used in this class...................... SA A N D SD
5. Too much time in this class has been devoted to unimportant topics..SA A N D SD
6. I can not see that this method of teaching has any advantage over other methods.. SA A N D SD
7. All my expectations have been exceeded in this class............... SA A N D SD
8. Some students, but not others, benefit from the method of teaching this class.. SA A N D SD
9. I feel indifferent toward the subject matter of this class......... SA A N D SD
10. The subject matter presented in this class is paced too fast....... SA A N D SD
11. I am glad that this class was taught using this method.............SA A N D SD
12. This class has been a disappointment to me......................... SA A N D SD
13. Because of the enthusiasm I have for this class I find it very easy to study this subject.................................... SA A N D SD
14. The method used in this class forces me to spend too much time on material I already know............................... SA A N D SD
15. The method used to teach this class should be used for all classes. SA A N D SD
16. There is not enough participation by students in this class........ SA A N D SD
17. We could cover the material faster if some other method of teaching were used... SA A N D SD
18. The method of presentation in this class explains why I remember the material.. SA A N D SD
19. I have learned more in this class than I thought I would........... SA A N D SD
20. My freedom in this class is curtailed by the teaching method....... SA A N D SD
21. The way this class is taught leaves me enthusiastic................ SA A N D SD
22. The method of instruction used in this class needs extensive improvement.. SA A N D SD
23. This is a well organized class..................................... SA A N D SD
24. I had hopes that this class would be better than it is............. SA A N D SD
25. When I wanted to review in this class I have not had a chance...... SA A N D SD
26. I am interested in the subject matter of this class................ SA A N D SD

Form C

____
Identification

ATTITUDE SCALE

This scale has been prepared so that you can indicate how you feel about this class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA	if you strongly agree with the statement
A	if you agree but not strongly so
N	if you are neutral or undecided
D	if you disagree but not strongly so
SD	if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

1. My attitude about the methods used in teaching this course can be described as "satisfactory" .... SA A N D SD
2. I feel less favorable toward this class than I did................. SA A N D SD
3. Increasing the contact between teacher and students would improve this class...SA A N D SD
4. I like the way this class is taught................................ SA A N D SD
5. The unimportant topics in this class have been given too much time. SA A N D SD
6. I cannot see any advantage for this method of teaching over any other methods... SA A N D SD
7. My highest expectations have been exceeded in this class........... SA A N D SD
8. The method of teaching this class works well for some students but not for others... SA A N D SD
9. I neither like nor dislike the subject matter of this class........ SA A N D SD
10. The rate of presenting material in this class is too fast.......... SA A N D SD
11. I am happy that the method of teaching this class was used......... SA A N D SD
12. My feeling about this class is one of disappointment................ SA A N D SD
13. This class gives me real enthusiasm for the study of this subject.. SA A N D SD
14. I already know the material in this class yet the method of instruction forces me to spend time on it........................ SA A N D SD
15. All other classes should be taught by the same method used in this class... SA A N D SD
16. There is not as much student participation in this class as there should be... SA A N D SD
17. The progress of the class is delayed because of the teaching method used... SA A N D SD
18. Because of the method used in this class the material stays with me... SA A N D SD
19. I have learned more in this class than I expected to learn......... SA A N D SD
20. As far as freedom is concerned, the method of instruction in this class doesn't give me enough................................ SA A N D SD
21. The teaching method in this class gives me a feeling of enthusiasm. SA A N D SD
22. The method of instruction used in this class needs a lot of improvement .... SA A N D SD
23. There is good organization of subject matter in this class......... SA A N D SD
24. This class is not as good as I hoped it would be.................... SA A N D SD
25. In this class I have not had a chance to go back over the material. SA A N D SD
26. I am interested in the content of this class........................ SA A N D SD

Form D

Identification

ATTITUDE SCALE

This scale has been prepared so that you can indicate how you feel about this class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA	if you strongly agree with the statement
A	if you agree but not strongly so
N	if you are neutral or undecided
D	if you disagree but not strongly so
SD	if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

1. As far as I am concerned the methods used in this class have been satisfactory.. SA A N D SD
2. My feelings about this class are less favorable than they were..... SA A N D SD
3. There should be more contact between teacher and students in this class.. SA A N D SD
4. The way this class is taught pleases me......................... SA A N D SD
5. Too much time in this class has been spent going over unimportant topics... SA A N D SD
6. I cannot see that this method of teaching offers any advantage over other methods.. SA A N D SD
7. Every expectation I had for this class has been exceeded.......... SA A N D SD
8. The method of teaching this class is better for some students than for others.. SA A N D SD
9. The subject matter of this class leaves me with an indifferent attitude... SA A N D SD
10. In this class the subject matter is presented at too fast a pace... SA A N D SD
11. I am happy about the teaching method used in this class........... SA A N D SD
12. I am disappointed with this class................................ SA A N D SD
13. I study the subject offered in this class enthusiastically......... SA A N D SD
14. I already know the material yet I am forced to spend too much time on it by the method used in this class......................... SA A N D SD
15. The teaching method in this class should be used by teachers in all other classes... SA A N D SD
16. Student participation is not as extensive as it should be in this class... SA A N D SD
17. The method used to teach this class causes students to go too slow. SA A N D SD
18. I retain the material in this class because of the method used to present it... SA A N D SD
19. I have learned more in this class than I anticipated learning...... SA A N D SD
20. Because of the teaching method used in this class, I can't do as much on my own as I want to do.................................. SA A N D SD
21. I am enthusiastic about the way this class is taught.............. SA A N D SD
22. The method of instruction used in this class leaves a lot to be desired.. SA A N D SD
23. The subject matter in this class is well organized................ SA A N D SD
24. This class has not met the hopes that I had for it................ SA A N D SD
25. I have not had a chance to review the information presented in this class... SA A N D SD
26. I find the content of this class interesting....................... SA A N D SD

Form E

____
Identification

ATTITUDE SCALE

This scale has been prepared so that you can indicate how you feel about this class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA if you strongly agree with the statement
A if you agree but not strongly so
N if you are neutral or undecided
D if you disagree but not strongly so
SD if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

1. The methods used in teaching this class can be described as satisfying .... SA A N D SD
2. My attitude toward this class has become less favorable than it was SA A N D SD
3. More contact between teacher and students would improve this class. SA A N D SD
4. I find that the method used in the class is satisfying to me....... SA A N D SD
5. Unimportant topics have taken too much of my time in this class.... SA A N D SD
6. I cannot see that this teaching method has an advantage over any other methods... SA A N D SD
7. This class exceeds every expectation I had for it.................. SA A N D SD
8. The method of teaching this class is not equally good for all students.. SA A N D SD
9. I have only neutral feelings about the subject matter in this class SA A N D SD
10. The presentation of this class is paced too fast.................. SA A N D SD
11. I am glad that this method of teaching was used for this class..... SA A N D SD
12. This has been a disappointing class............................... SA A N D SD
13. I find myself enthusiastic when I study this subject............... SA A N D SD
14. I am forced by the method used in this class to spend too much time on material I already know.................................. SA A N D SD
15. I feel that all classes should be taught by the method used in this class.. SA A N D SD
16. This class lacks student participation............................. SA A N D SD
17. The method used to teach this class holds students back too much....SA A N D SD
18. My high retention of the material in this class is due to the method used to present it...................................... SA A N D SD
19. The amount I have learned in this class exceeds my expectation..... SA A N D SD
20. I want to do more on my own in this class but I can't because of the teaching method.. SA A N D SD
21. I am enthusiastic about the way this class is taught............... SA A N D SD
22. The method of instruction used in this class has many shortcomings. SA A N D SD
23. I would describe this class as well organized...................... SA A N D SD
24. Not all my hopes about this class have been fulfilled.............. SA A N D SD
25. I have not had a chance to look back over the material when I wanted to in this class..................................... SA A N D SD
26. The content of this class is interesting.......................... SA A N D SD

Form E

____
Identification

ATTITUDE SCALE

This scale has been prepared so that you can indicate how you feel about this class. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA	if you strongly agree with the statement
A	if you agree but not strongly so
N	if you are neutral or undecided
D	if you disagree but not strongly so
SD	if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about this class.

1. The methods used in teaching this class can be described as satisfying .... SA A N D SD
2. My attitude toward this class has become less favorable than it was SA A N D SD
3. More contact between teacher and students would improve this class. SA A N D SD
4. I find that the method used in the class is satisfying to me....... SA A N D SD
5. Unimportant topics have taken too much of my time in this class.... SA A N D SD
6. I cannot see that this teaching method has an advantage over any other methods.. SA A N D SD
7. This class exceeds every expectation I had for it.................. SA A N D SD
8. The method of teaching this class is not equally good for all students.. SA A N D SD
9. I have only neutral feelings about the subject matter in this class SA A N D SD
10. The presentation of this class is paced too fast.................. SA A N D SD
11. I am glad that this method of teaching was used for this class..... SA A N D SD
12. This has been a disappointing class................................ SA A N D SD
13. I find myself enthusiastic when I study this subject............... SA A N D SD
14. I am forced by the method used in this class to spend too much time on material I already know.................................. SA A N D SD
15. I feel that all classes should be taught by the method used in this class.. SA A N D SD
16. This class lacks student participation............................. SA A N D SD
17. The method used to teach this class holds students back too much....SA A N D SD
18. My high retention of the material in this class is due to the method used to present it..................................... SA A N D SD
19. The amount I have learned in this class exceeds my expectation..... SA A N D SD
20. I want to do more on my own in this class but I can't because of the teaching method....................................... SA A N D SD
21. I am enthusiastic about the way this class is taught............... SA A N D SD
22. The method of instruction used in this class has many shortcomings. SA A N D SD
23. I would describe this class as well organized...................... SA A N D SD
24. Not all my hopes about this class have been fulfilled.............. SA A N D SD
25. I have not had a chance to look back over the material when I wanted to in this class................................ SA A N D SD
26. The content of this class is interesting........................... SA A N D SD

Form JC

____
Name

LANGUAGE LAB QUESTIONNAIRE

This scale has been prepared so that you can indicate how you feel about your language lab. PLEASE RESPOND TO EVERY ITEM. In each case, draw a circle around the letter which represents your own reaction as follows:

SA if you strongly agree with the statement
A if you agree but not strongly so
N if you are neutral or undecided
D if you disagree but not strongly so
SD if you strongly disagree with the statement

Remember, the only correct answer is the one which actually represents how you feel about your language lab.

1. The language lab makes the course more interesting.................SA A N D SD
2. From what I know about it, a tape recorder is an excellent way to learn a foreign language...SA A N D SD
3. Using text books is a poor way to learn a foreign language.........SA A N D SD
4. I do not like using equipment in a language lab....................SA A N D SD
5. Using the language lab makes it easier to learn the language........SA A N D SD
6. From what I know about foreign language films, I don't think that they are very much help in learning a language.....................SA A N D SD
7. I would rather not have a language lab..............................SA A N D SD
8. Text books provide the best means of studying a foreign language....SA A N D SD
9. Language films are a waste of class time............................SA A N D SD
10. This foreign language does not interest me..........................SA A N D SD
11. A foreign language lab is a waste of money..........................SA A N D SD
12. I would like to study this language for several more years.........SA A N D SD
13. It seems to me that movies can be an important aid in learning a foreign language...SA A N D SD
14. Better pronunciation is about all that can be learned in a foreign language lab...SA A N D SD
15. I think that the language we are studying is very interesting.......SA A N D SD
16. I can't see any advantage to the language lab.......................SA A N D SD
17. I do not like to study this foreign language........................SA A N D SD
18. We do not have enough freedom in our language lab...................SA A N D SD
19. Foreign language text books are a bore..............................SA A N D SD
20. Using the language lab is fun.......................................SA A N D SD
21. Using the language lab makes translations more interesting..........SA A N D SD
22. Foreign language films do not help very much in learning a foreign language...SA A N D SD
23. Grammar is about all that can be learned from foreign language text books..SA A N D SD
24. Language labs provide the best way to learn a foreign language.....,SA A N D SD
25. I like to study this language.......................................,SA A N D SD
26. I can learn the language better from books than from lab work......,SA A N D SD

*STATEMENT TO BE READ TO THE STUDENTS

______________________________________School is cooperating with Colorado State University in trying to find our students' opinions about (Spanish, French, German) and the methods used to teach this subject. By methods we mean the way you spend your time in class and in using the foreign language laboratory, filmstrips, motion pictures, textbooks, grammar books, oral dialogs, tape recordings and other class activities.

From time to time throughout the year, you will be asked to complete a form about (Spanish, French, German) and the way it is being taught. These same forms are being filled out by other students in several places throughout the United States. Although all classes in (Spanish, French, German) will complete the questionnaire at some time during the year, not all classes will complete it at the same time.

The opinions you give will not affect your grade. In fact, we will send all forms to Colorado State University as soon as you complete them. The results of this study will assist your schools in organizing and improving class activities in foreign language instruction.

Be sure to write your name in the space at the upper right corner of the questionnaire marked "identification."

*In the event that some of your students have had no experience whatsoever with a language lab, include the following statement, "If you have not had enough experience with a language lab to give a response to any item, omit the item."; otherwise, encourage the students to respond to every item.

REGRESSION DATA FOR INSTRUCTIONAL SITUATIONS COMPRISING THE ELEVEN MEDIA GROUPS

GROUPS I - VII

Situation	N	Method			Expectation			Content			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Group I Programed Instruction													
Self Paced German, CSU	16	-.4875	-.2142	46.9	-.1687	-.0758	15.4	-.0937	-.0044	15.9	-.6875	-.1964	78.2
Teacher Paced German, CSU	35	-.1514	.4061	49.9	-.0342	-.1102	16.2	-.0285	.1428	16.1	-.2942	.4183	82.3
Audio Visual Program, CU	49	-1.5571	.2580	41.6	-.5938	.0131	14.1	-.3918	.1078	14.3	-2.5102	.4198	70.2
Programed English, CSU	117	-.4897	.0653	41.6	-.1829	.0231	13.4	-.2598	.0512	13.4	.9880	.2051	68.5
Programed Letter Writing, State Farm Insurance	15	-1.0133	.9142	38.5	-.2466	.2238	12.4	-.4333	.2333	14.2	-1.7066	1.4190	65.0
Audio Visual Program, CU	25	-.1720	.0485	42.6	-.1400	-.0028	13.4	-.0640	.0171	14.2	-.3400	.0942	70.4
Group II ETV													
Anthropoloty S Room, CU	34	-.5000	.1806	37.9	-.3617	.0609	12.4	-.3411	.0462	14.6	-1.2588	.2689	65.0

Situation	N	Method			Expectation			Content			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Agricultural Economics, U of Mo.	55	-.7163	-.0987	33.8	-.3018	.0961	11.2	-.2490	.1545	11.9	-1.1272	.1090	56.6
General Psychology, U of Mo.	165	-.6600	.2212	31.6	-.4103	.0766	10.0	-.3084	.1311	12.4	-1.3812	.4082	54.0
Anthropology, L Room, CU	69	-.7840	.1894	37.7	-.4072	.0238	12.5	-.5260	.0175	14.8	-1.7260	.2287	65.1
Group III Programed Anatomy Laboratory	74	-1.6243	-.2857	41.9	-.5243	-.1023	12.9	-.5432	.0347	14.9	-2.6621	-.3745	69.7
Group IV H.S. Language Media Emphasis													
Spanish III	25	-1.3840	.2171	40.0	-.3800	.0600	11.9	-.4280	.0200	12.5	-2.2120	.3114	64.3
Spanish 8	25	-1.4120	-.1457	4.16	-.3960	-.0371	12.5	-.7480	-.1000	13.0	-2.4880	-.2000	67.2
Spanish II	89	-.4865	.3025	38.0	-.2112	.1123	11.4	-.2719	.0963	12.1	-1.0314	.5136	61.5
Spanish I	77	-1.1259	-.2087	37.4	-.5961	.0695	11.9	-.3987	-.1159	12.4	-2.1922	.3487	61.7
Group V H.S. Language Conventional Lab													
Spanish IV	12	-1.0750	.5297	38.2	-.5750	.3750	12.1	-.0916	-.0416	7.1	-1.8416	.7916	57.4
Spanish III	61	-.8704	..5046	38.8	-.3344	.0491	13.2	-.2114	.1229	6.4	-1.4163	.6768	58.4

Situation	N	Method			Expectation			Content			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Spanish II	100	-1.3750	.4792	31.7	-.5290	.2307	10.8	-.1500	.0771	5.9	-2.0700	.8228	48.5
Spanish I	38	-2.5236	.4078	34.6	-1.2078	.1146	11.7	-.1815	.1334	6.0	-3.9000	.6428	52.4
Spanish III	5	-.3000	-.6142	34.0	.1200	-.1714	10.8	-.1000	.1000	7.2	-.3400	-.7285	52.2
German II	35	-.8565	.1211	39.2	-.5913	-.0186	12.7	-.1695	.0279	6.5	-1.5695	.0279	58.2
German I	53	-2.4686	.6624	35.8	-.8705	.1988	11.5	-.1235	.0546	6.5	-3.4235	.9803	53.8
French III	32	-1.4093	.1406	29.9	-.5156	-.0245	10.5	-.1031	.0111	6.1	-2.0281	.1272	46.6
French II	30	-.5666	.2857	32.1	-.2300	.1119	10.8	-.1866	-.0714	6.2	-.9600	.3142	49.2
French I	33	-2.7515	1.1255	34.5	-.9060	.4653	11.3	-.1636	-.0779	6.5	-3.3696	1.3333	52.7
Group VI Small University Classes													
Educational Psych. U of Mo.	152	-.4039	-.0375	30.1	-.0881	-.1015	7.6	-.0782	-.0465	10.2	-.5835	-.1358	47.8
Conventional German, CSU	125	-.2864	-.1691	38.5	-.2128	-.1074	11.7	-.2088	.0200	13.9	-.6584	-.2885	64.3
Conventional English Composition, CSU	86	-.0093	.2790	34.3	-.0337	.1021	10.4	-.1418	.1478	11.3	-.2302	.4700	56.3
Group VII Large University Classes													
Conventional Anthropology, CU	53	-.4444	.4867	37.3	-.4666	.2989	11.1	-.3740	.1984	12.0	-1.3314	1.0701	60.5

Situation	N	Method			Expectation			Content			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Educational Psych. U of Mo.	161	-.4970	-.0582	30.4	-.2375	-.0829	8.3	-.2047	-.0544	10.4	-.9642	-.2057	49.3
Large English Class	384	.1380	.1654	29.3	.0082	.0985	9.1	.0962	.0167	11.1	.2571	.2505	49.9

REGRESSION DATA FOR INSTRUCTIONAL SITUATIONS COMPRISING THE
REGRESSION DATA FOR INSTRUCTIONAL SITUATIONS COMPRISING THE ELEVEN MEDIA GROUPS

GROUPS VIII - XI

Situation	N	Laboratory			Film			Content			Textbook			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Group VIII H.S. Language Con. Lab.																
German I Period 1	19	.2631	-.0676	24.5	-.0263	.0563	9.5	-.8105	-.3082	12.2	.1947	-.2744	7.0	-.7315	-.6804	53.4
German II Period 2	5	-1.4200	.8714	23.9	-.7400	.1285	11.0	-1.0200	.3857	13.5	-.5400	-.1857	9.0	-3.7600	1.2000	57.5
Spanish I Period 2	21	.3952	-.4387	31.7	-.5047	-.1088	12.0	-.3571	-.1938	14.1	-.3000	.1666	7.3	-.9428	-.7006	65.3
Spanish II Period 6	20	1.0650	.1964	33.7	-.2300	0.0000	12.8	.1700	.0785	14.8	-.5450	.1035	8.2	.3700	.4285	69.7
French I Period 1	27	-1.5185	.1693	31.2	-.5111	-.1481	13.9	-.7777	-.2962	15.0	0.0000	.1851	5.7	-2.6962	.0105	65.9
French II Period 3	22	-1.1739	.0869	35.7	-.0826	-.2329	14.1	-.4217	-.2080	17.7	-.0130	.0962	5.2	-1.8043	-.2329	72.0
French III Period 4	7	-1.2714	-.1734	38.6	-.0142	.0714	13.0	-.4571	-.1632	12.8	.2000	.0816	5.5	-1.5428	-.1836	70.0
Group IX H.S. Language Media Emphasis																

Situation	N	Laboratory			Film			Content			Textbook			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Spanish III Period 3	23	-.9956	.6614	16.8	-.4173	.1925	9.4	-.3782	-.1273	14.9	-.2347	-.1801	9.6	-1.6782	.3478	50.4
Spanish II Period 2	9	.0333	1.2142	23.2	.3333	-.1587	9.2	.1222	.2142	13.9	.1777	.0952	11.4	.5444	1.1349	57.8
French I Period 1	7	-.5714	-.2040	36.9	-.6571	-.0612	10.3	-.3000	-.0306	16.6	-.1714	.0204	10.9	-2.0714	-.0102	75.2
German I Period 3	16	-.3375	.0089	32.5	.1000	.0982	9.5	-.7125	.3660	14.6	-.0125	.0178	9.4	-1.0000	.4821	66.1
German II Period 6	10	-.8600	1.0571	30.2	-.0600	.0571	9.3	-.8200	.0857	14.6	-.4400	-.3142	9.2	-1.9100	.9642	63.3
German I Period 7	16	-.5875	.2946	31.0	-.0250	.0089	8.7	-.3812	.0133	14.0	.2000	-.2410	8.7	-.7562	.1473	62.9
Spanish I Period 2	20	.1550	.1750	30.9	.1150	.2464	10.3	-.5550	-.0321	13.1	-.1050	-.1392	10.0	-.3050	.3392	64.7
French II Period 3	14	-.5357	.6785	24.2	.4857	-.0306	9.4	-.4857	.2244	11.7	-.0357	-.0867	8.8	-.6357	.7602	53.8
Group X J.H. Language Conventional Laboratory																
French 7 Period 1	28	-1.8464	.0433	37.1	.0785	.0867	7.4	-.5357	-.0969	15.8	.4357	-.0867	6.8	-1.8964	-.0331	66.8

Situation	N	Laboratory			Film			Content			Textbook			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
French I Period 7	28	-1.5000	-.8412	33.7	-.5944	.3690	9.3	-.5888	-.3968	11.4	-.7888	.0317	5.3	-3.4833	-.9642	60.5
Spanish 7 Period 1	29	-3.0344	.2758	24.6	-.1448	.1280	7.4	-.3896	.1059	15.6	.1827	-.0024	7.7	-3.2586	.4014	52.3
French 7 Period 4	9	-4.7111	1.7936	16.1	.2333	.2142	8.1	.0888	-.1746	16.1	.8111	-.3412	8.2	-3.5777	1.4603	48.7
French 7 Period 3	16	-1.4250	.2321	25.5	-.4562	.4151	10.3	-.9375	.0446	15.0	-.2187	-.3794	7.7	-2.9062	.1205	56.6
Spanish 7 Period 8	20	-2.3900	-.2571	36.3	.2500	-.4500	12.1	-.0700	.0214	11.9	.2950	.4178	7.0	-2.0150	-.2678	67.5
Spanish 8 Period 2	17	-1.3647	.6806	24.6	.4176	.0210	10.7	-.4352	.1260	10.6	-.2235	.0252	9.2	1.5000	.8697	55.2
Spanish 7 Period 8	22	-3.4136	-.9383	25.8	-.0318	.1006	8.5	-.9090	.0064	11.8	.2929	-.1428	7.3	-4.1818	-1.0454	53.4
Spanish 8 Period 3	29	-1.6000	.3004	27.6	.0724	.1206	8.0	-.0896	-.1133	10.0	.0034	.1453	7.2	-1.7275	.4950	52.6
Spanish 9 Period 2	20	-3.1950	1.0178	25.9	.0100	.0500	8.0	-.7150	.0964	10.2	.3000	-.0142	8.6	-3.2100	1.0142	53.3
Spanish 8 Period 2	26	-1.9384	.1593	31.1	-5.0730	2.2060	14.8	-.9192	-.0521	12.8	.5115	-.1675	8.4	-2.2115	-.1181	61.5

Group XI
J.H. Language
Media
Emphasis

Situation	N	Laboratory			Film			Content			Textbook			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
Spanish I Period 5	25	-1.9640	.2314	25.2	.2480	-.1942	9.7	-.5960	-.0657	12.1	.4120	-.2885	10.2	.2480	-1.9885	55.2
French 2 Period 5	16	-2.7375	.6785	22.7	-.1812	.3169	7.9	-.9125	.6785	14.0	-.3625	.3214	9.2	-4.4812	2.1919	53.7
French 7 Period 6	27	-1.6555	.0079	40.0	.0074	-.1428	12.2	-.5000	-.1455	15.1	-.0888	-.0476	10.6	-2.2962	-.2645	77.6
Spanish 8 Period 3	32	-2.5937	.3660	27.8	-.1437	.0982	10.3	-.2968	.2477	13.6	-.1156	.1941	9.4	-3.0843	.8415	61.4
Spanish II Period 7	30	-.4700	-.1166	27.7	.0266	.2523	9.3	-.4566	-.0357	14.1	-.2133	.2047	8.5	-1.1200	.3000	59.7
Spanish 7 Period 6	33	-1.1545	-.4740	40.2	.2666	.0259	10.0	-.4060	.0216	13.9	-.5636	.1948	7.6	-1.6000	-.1991	71.6
French 7 Period 4	34	-1.3238	.3061	32.8	.2619	-.0918	9.6	-.1238	-.0816	15.5	-.1619	-.1768	9.6	-1.3476	.1598	67.7
French 9 Period 7	26	-1.6095	.3741	27.0	-.2095	-.0136	7.7	-.7095	-.1326	11.1	-.6904	-.1054	7.5	-3.2380	.1224	53.4
French I Period 2	7	-2.1285	.7857	20.0	-.3000	-.0306	7.9	-.6857	-.2040	12.4	-.9571	-.2551	9.7	-4.0142	.2551	50.3
French II Period 8	20	-1.9650	-.2107	30.3	-.3100	-.3714	10.7	-.6700	.0285	14.1	-.5350	.0107	9.7	-3.5450	-.5035	64.8

Group XI
J.H. Language
Media
Emphasis

Situation	N	Laboratory			Film			Content			Textbook			Total		
		Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean	Beta 1	Beta 2	Mean
French 7 Period 7	19	-2.1157	.7819	37.3	-.0368	-.1015	12.2	-.5315	.1766	15.0	-.5789	.2556	8.0	-3.4421	.9849	72.6
Spanish 7 Period 2	25	-.0120	-1.5457	28.6	.8480	-.3828	10.7	-1.1920	-.0571	13.3	-.6160	.3428	6.5	-2.5640	-1.5457	58.9
Spanish 3 Period 4	19	-.5947	1.5225	10.3	-1.4052	-.1090	10.8	-1.0842	.3533	14.5	-.6684	.4097	6.2	-3.5052	1.9849	41.7
Spanish 1 Period 7	18	.1555	.0396	20.8	-.0111	.0793	10.9	-.2222	.2380	14.4	-.5111	.0396	8.5	-.5777	.4841	54.6
Spanish III Period 5	22	-.8681	.4383	17.8	-.8090	-.2077	10.0	-1.3000	.1038	12.9	-.4000	.1383	8.3	-3.0409	.6461	48.9